FIG.1

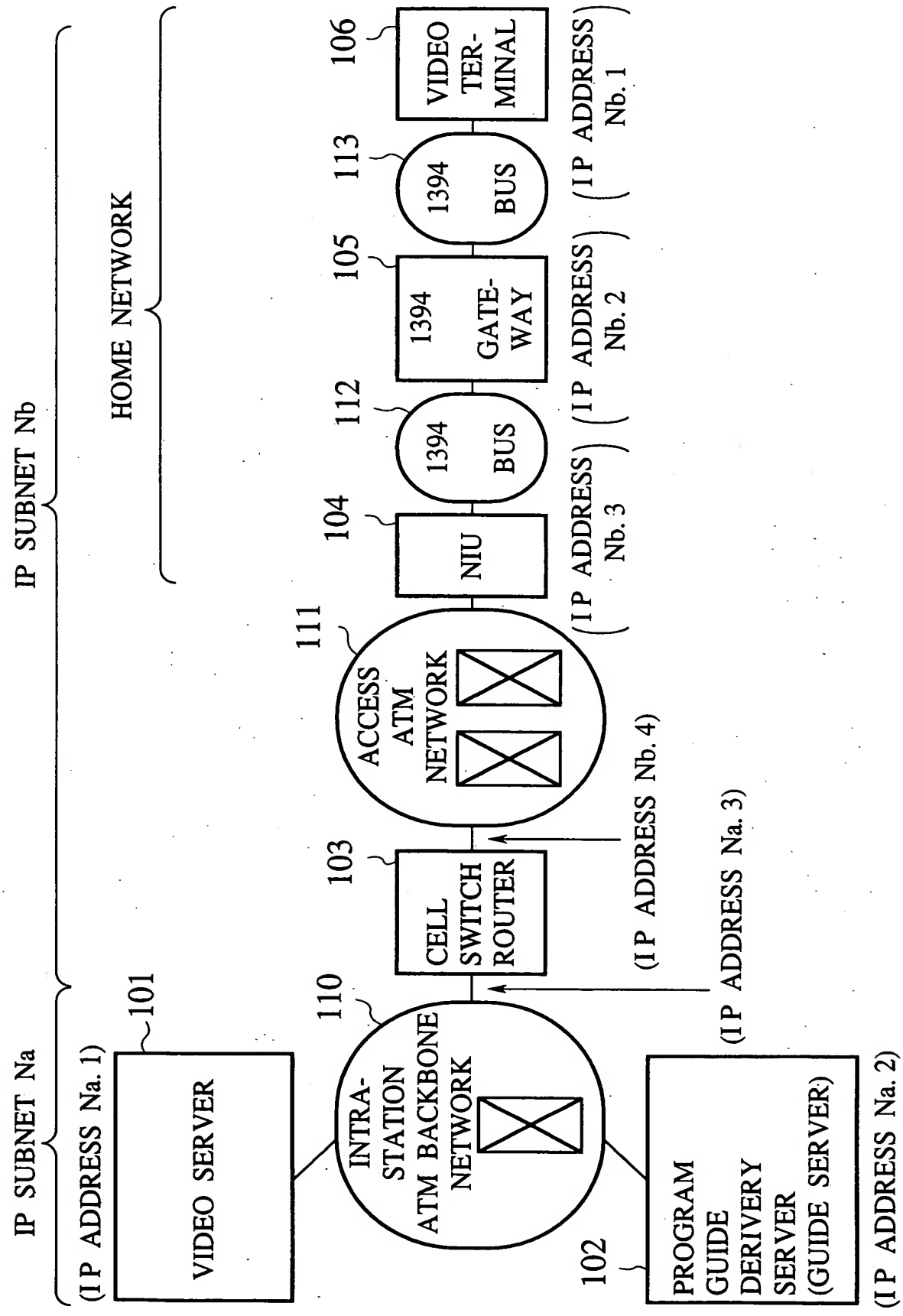

IP SUBNET Na
IP SUBNET Nb
HOME NETWORK
(IP ADDRESS Na. 1)
101
VIDEO SERVER
110
INTRA-STATION ATM BACKBONE NETWORK
102
PROGRAM GUIDE DERIVERY SERVER (GUIDE SERVER)
(IP ADDRESS Na. 2)
103
CELL SWITCH ROUTER
(IP ADDRESS Na. 3)
(IP ADDRESS Nb. 4)
111
ACCESS ATM NETWORK
104
NIU
(IP ADDRESS Nb. 3)
112
1394 BUS
(IP ADDRESS Nb. 2)
105
1394 GATE-WAY
113
1394 BUS
(IP ADDRESS Nb. 1)
106
VIDEO TER-MINAL

FIG.2

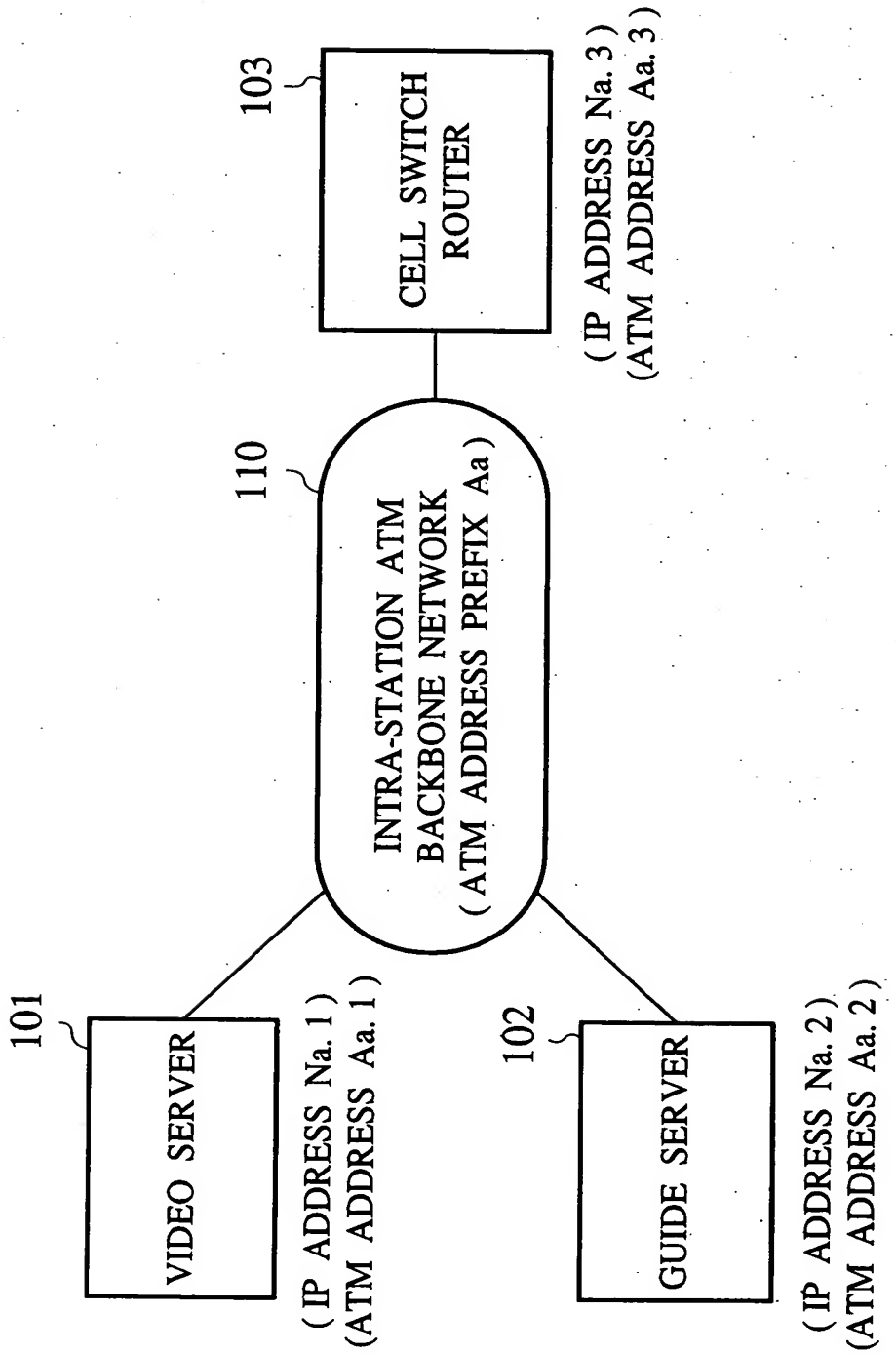

101
VIDEO SERVER
(IP ADDRESS Na. 1)
(ATM ADDRESS Aa. 1)
102
GUIDE SERVER
(IP ADDRESS Na. 2)
(ATM ADDRESS Aa. 2)
110
INTRA-STATION ATM
BACKBONE NETWORK
(ATM ADDRESS PREFIX Aa)
103
CELL SWITCH
ROUTER
(IP ADDRESS Na. 3)
(ATM ADDRESS Aa. 3)

FIG.3

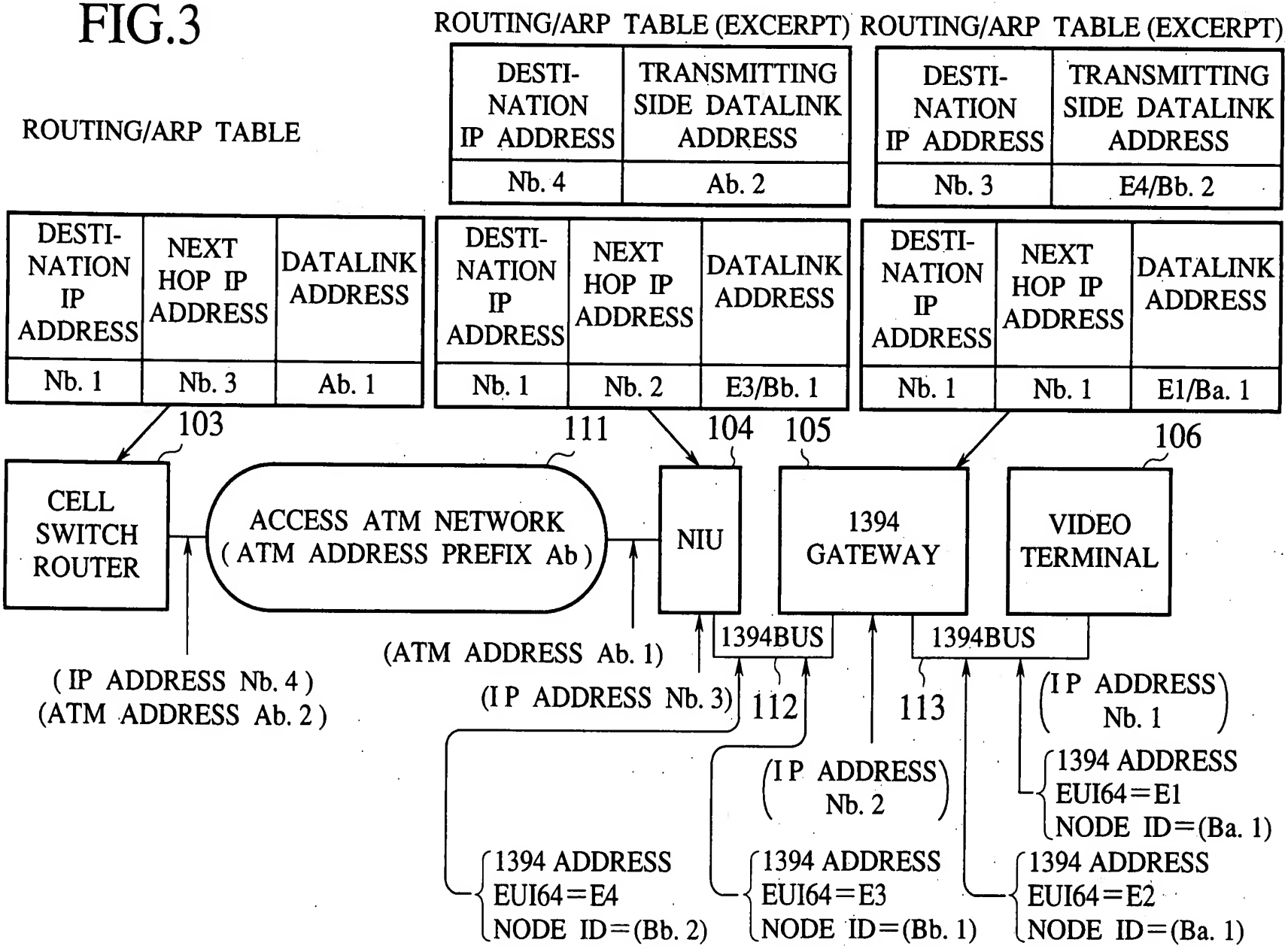


FIG.4

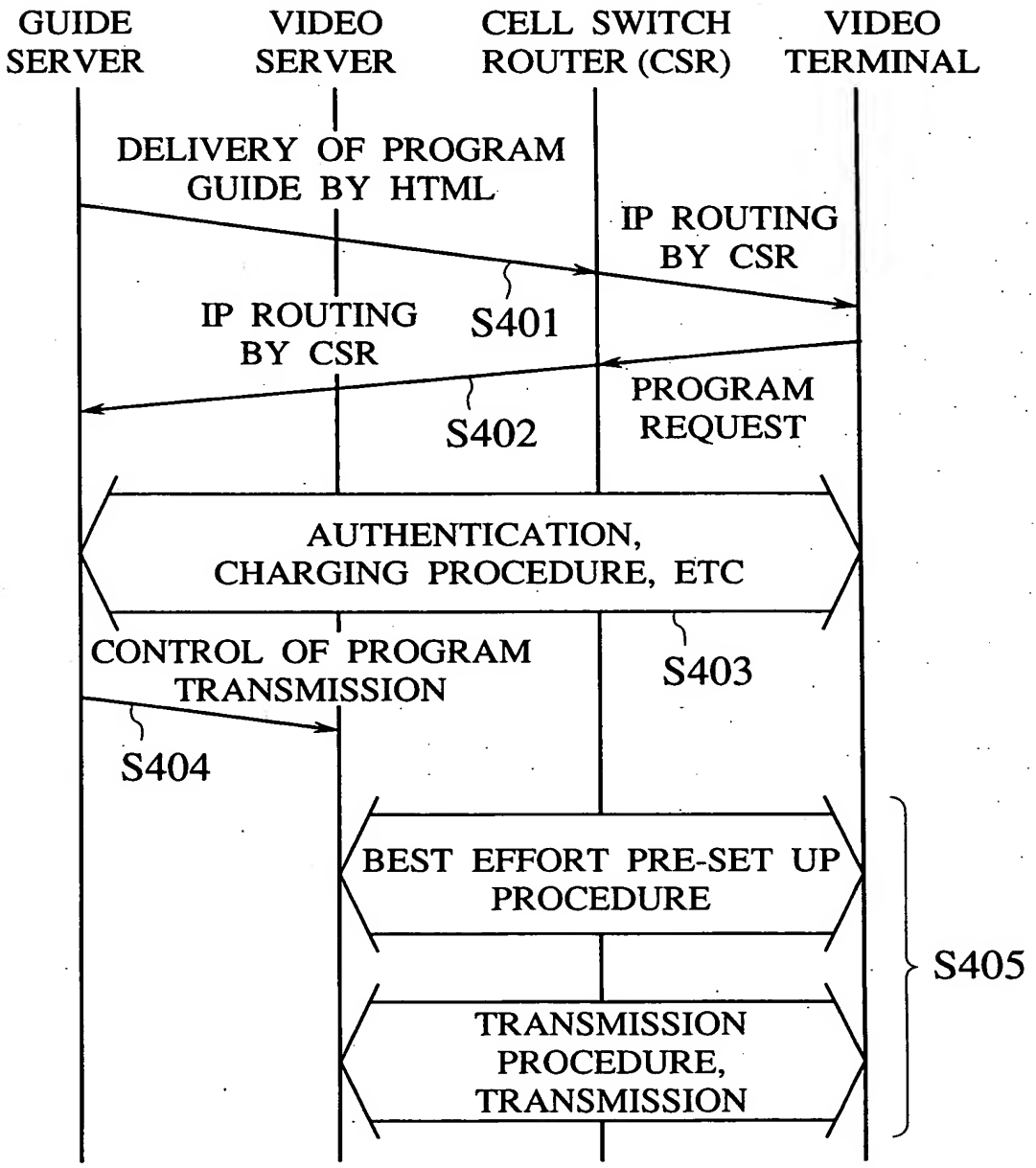

GUIDE SERVER
VIDEO SERVER
CELL SWITCH ROUTER (CSR)
VIDEO TERMINAL
DELIVERY OF PROGRAM GUIDE BY HTML
IP ROUTING BY CSR
S401
IP ROUTING BY CSR
S402
PROGRAM REQUEST
AUTHENTICATION, CHARGING PROCEDURE, ETC
S403
CONTROL OF PROGRAM TRANSMISSION
S404
BEST EFFORT PRE-SET UP PROCEDURE
TRANSMISSION PROCEDURE, TRANSMISSION
S405

FIG.5

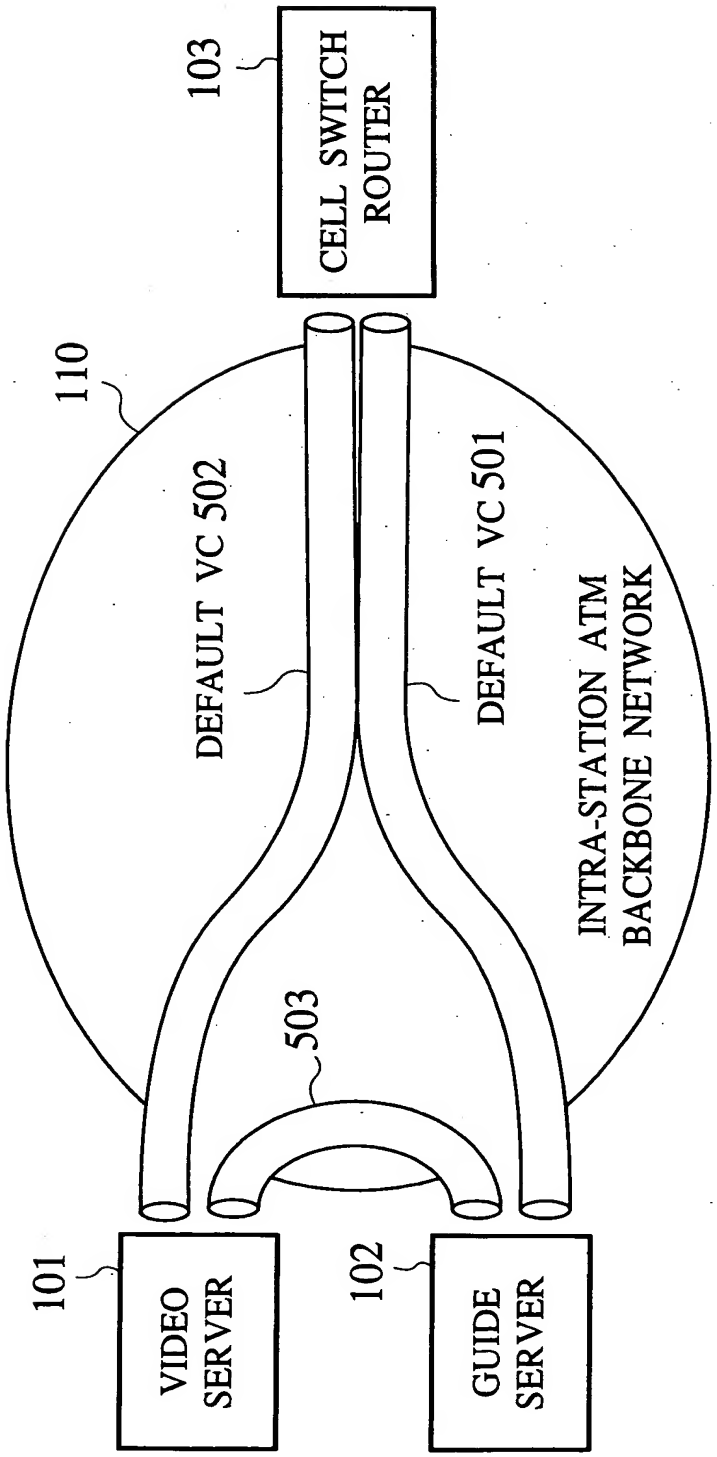

103
CELL SWITCH ROUTER
110
DEFAULT VC 502
DEFAULT VC 501
INTRA-STATION ATM BACKBONE NETWORK
503
101
VIDEO SERVER
102
GUIDE SERVER

FIG.6

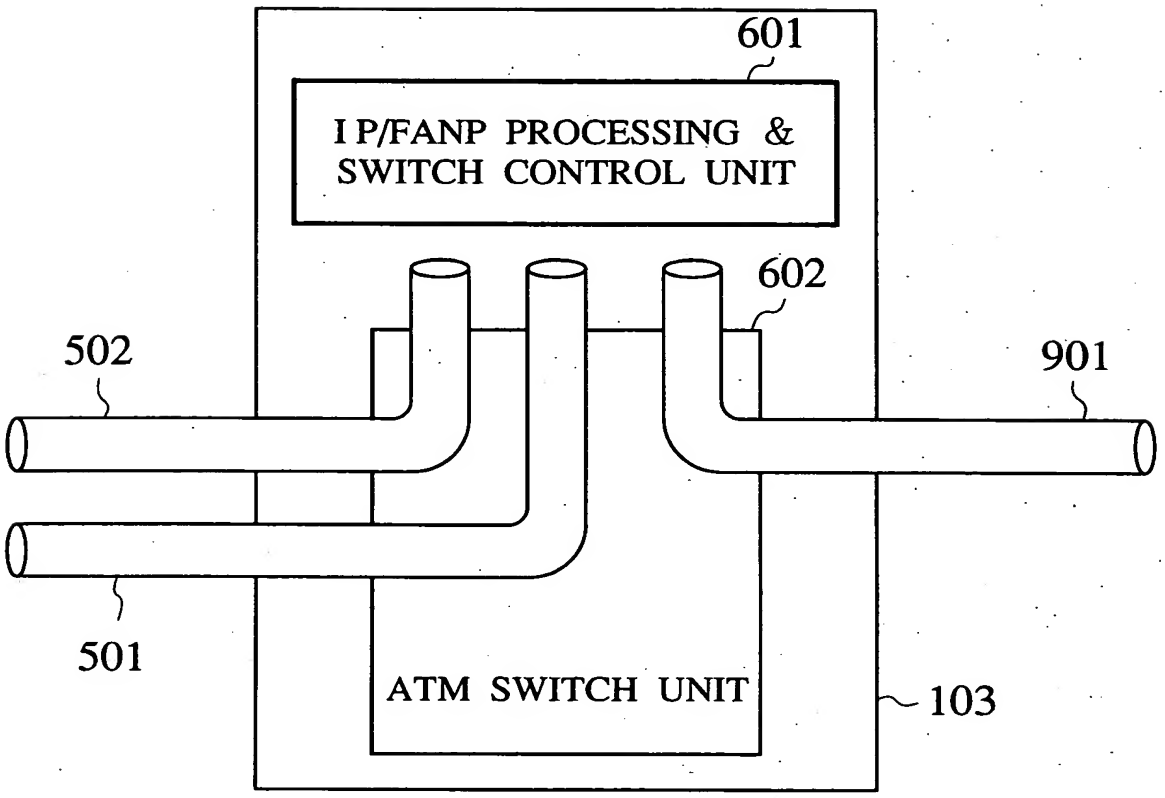

601
I P/FANP PROCESSING &
SWITCH CONTROL UNIT
602
502
901
501
ATM SWITCH UNIT
103

FIG.7

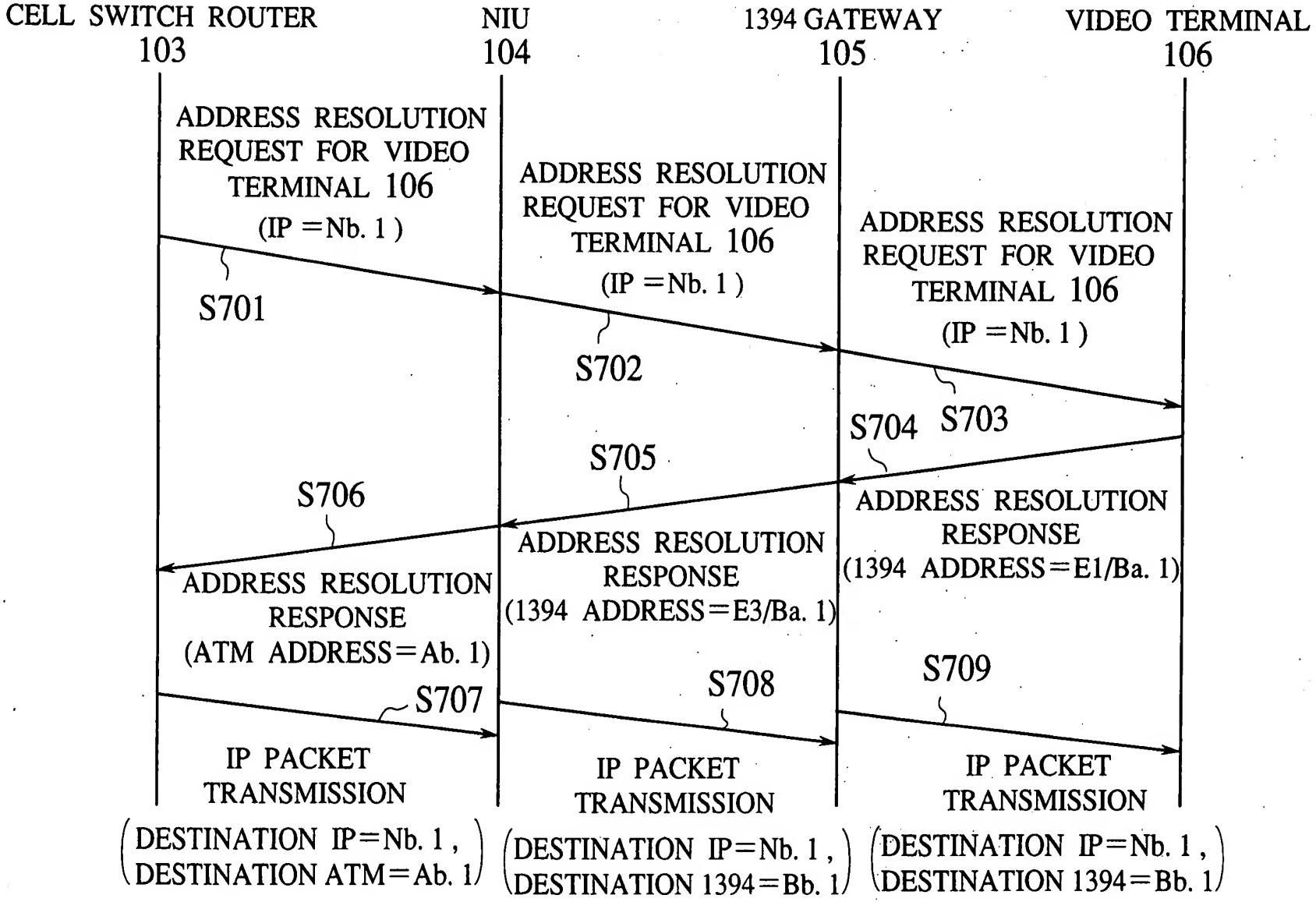


FIG.8

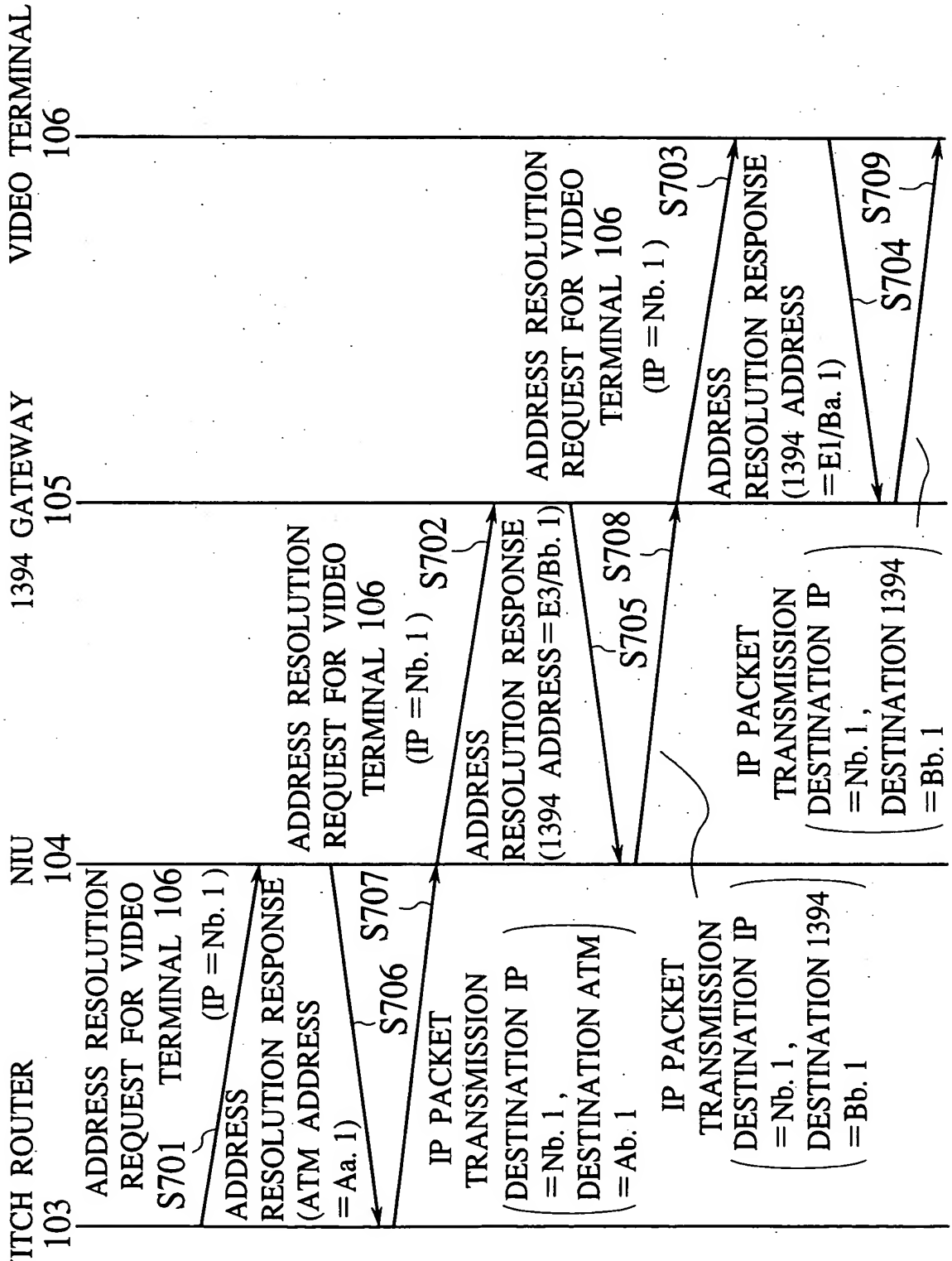

CELL SWITCH ROUTER 103
NIU 104
1394 GATEWAY 105
VIDEO TERMINAL 106
ADDRESS RESOLUTION REQUEST FOR VIDEO TERMINAL 106 (IP =Nb. 1)
S701
ADDRESS RESOLUTION RESPONSE (ATM ADDRESS =Aa. 1)
S706
ADDRESS RESOLUTION REQUEST FOR VIDEO TERMINAL 106 (IP =Nb. 1)
S702
ADDRESS RESOLUTION RESPONSE (1394 ADDRESS=E3/Bb. 1)
S705
ADDRESS RESOLUTION REQUEST FOR VIDEO TERMINAL 106 (IP =Nb. 1)
S703
ADDRESS RESOLUTION RESPONSE (1394 ADDRESS =E1/Ba. 1)
S704
IP PACKET TRANSMISSION (DESTINATION IP =Nb. 1, DESTINATION ATM =Ab. 1
S707
IP PACKET TRANSMISSION (DESTINATION IP =Nb. 1, DESTINATION 1394 =Bb. 1
S708
IP PACKET TRANSMISSION (DESTINATION IP =Nb. 1, DESTINATION 1394 =Bb. 1
S709

FIG.9

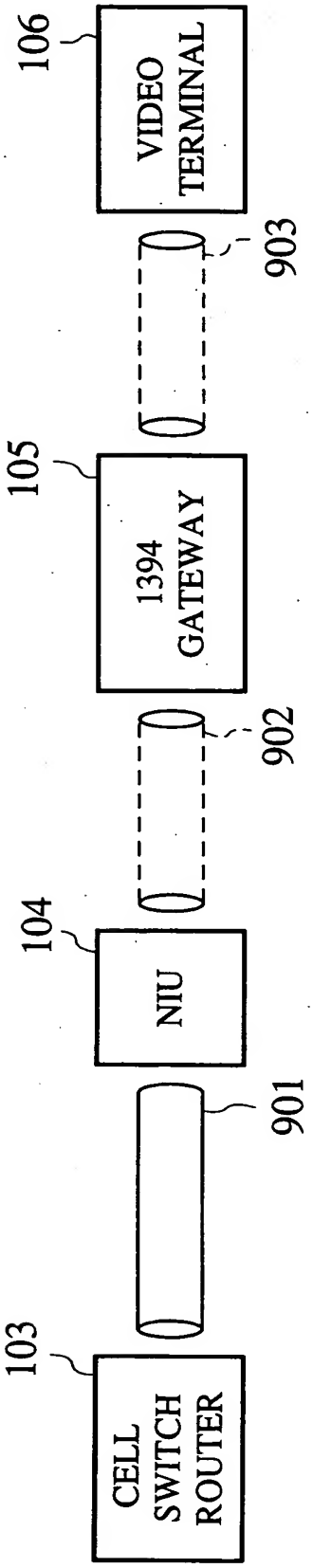

106
VIDEO TERMINAL
903
105
1394 GATEWAY
902
104
NIU
901
103
CELL SWITCH ROUTER

FIG.10

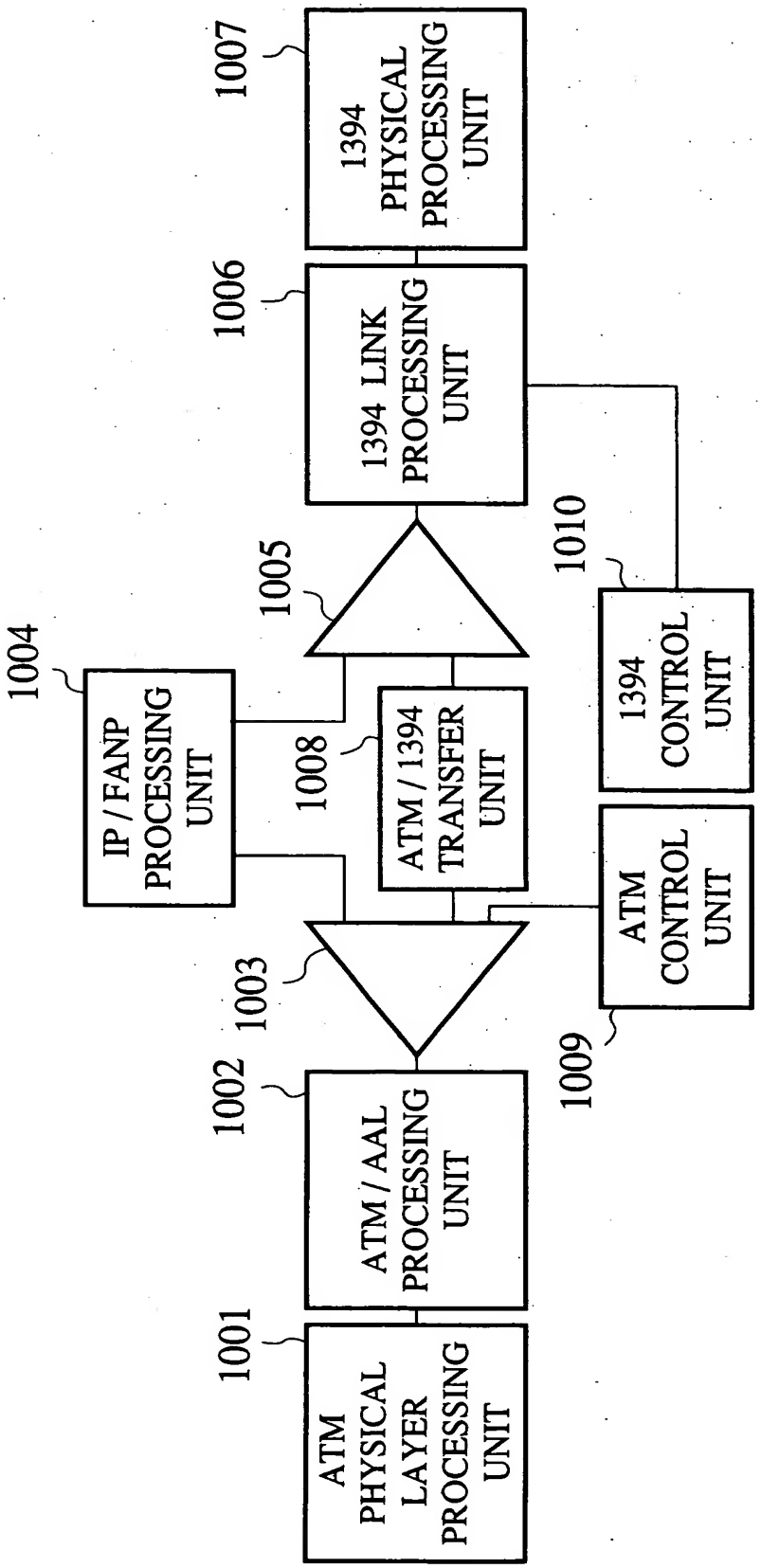

1007
1394 PHYSICAL PROCESSING UNIT
1006
1394 LINK PROCESSING UNIT
1005
1010
1394 CONTROL UNIT
1004
IP / FANP PROCESSING UNIT
1008
ATM / 1394 TRANSFER UNIT
ATM CONTROL UNIT
1003
1009
1002
ATM / AAL PROCESSING UNIT
1001
ATM PHYSICAL LAYER PROCESSING UNIT

FIG.11

DESTINATION IP ADDRESS	NEXT HOP IP ADDRESS	PHYSICAL PORT	DATALINK PHYSICAL ADDRESS
Nb. 1	Nb. 1	1394 SIDE	Bb. 1
Nb. 2	Nb. 2	1394 SIDE	Bb. 1
Nb. 4	Nb. 4	ATM SIDE	Ab. 2 (OR VCI)
Na	Nb. 4	ATM SIDE	Ab. 2 (OR VCI)
default	Nb. 4	ATM SIDE	Ab. 2 (OR VCI)
⋮	⋮	⋮	⋮

FIG.12

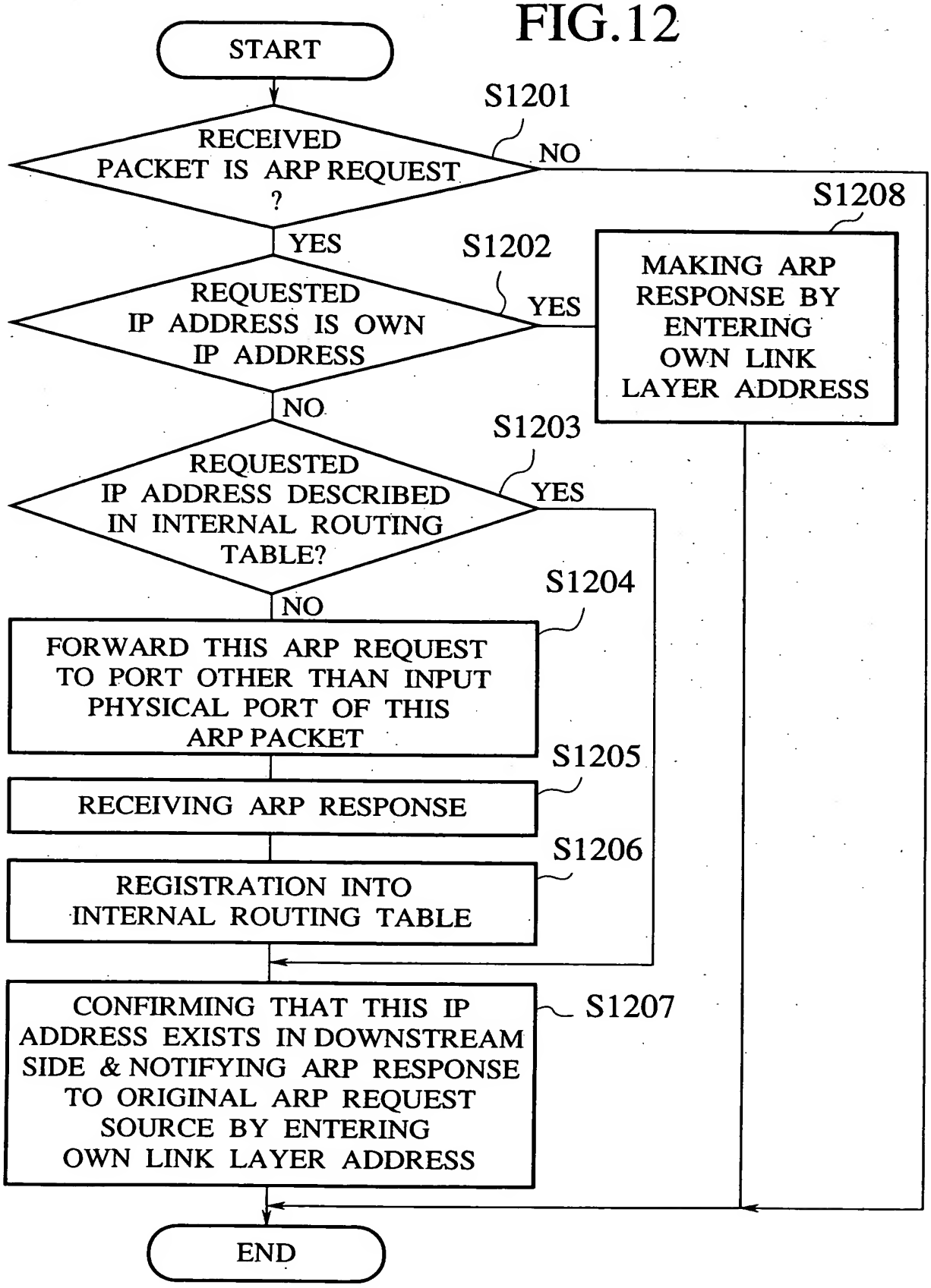

START
S1201
RECEIVED PACKET IS ARP REQUEST ?
NO
YES
S1208
S1202
REQUESTED IP ADDRESS IS OWN IP ADDRESS
YES
MAKING ARP RESPONSE BY ENTERING OWN LINK LAYER ADDRESS
NO
S1203
REQUESTED IP ADDRESS DESCRIBED IN INTERNAL ROUTING TABLE?
YES
NO
S1204
FORWARD THIS ARP REQUEST TO PORT OTHER THAN INPUT PHYSICAL PORT OF THIS ARP PACKET
S1205
RECEIVING ARP RESPONSE
S1206
REGISTRATION INTO INTERNAL ROUTING TABLE
S1207
CONFIRMING THAT THIS IP ADDRESS EXISTS IN DOWNSTREAM SIDE & NOTIFYING ARP RESPONSE TO ORIGINAL ARP REQUEST SOURCE BY ENTERING OWN LINK LAYER ADDRESS
END

FIG.13

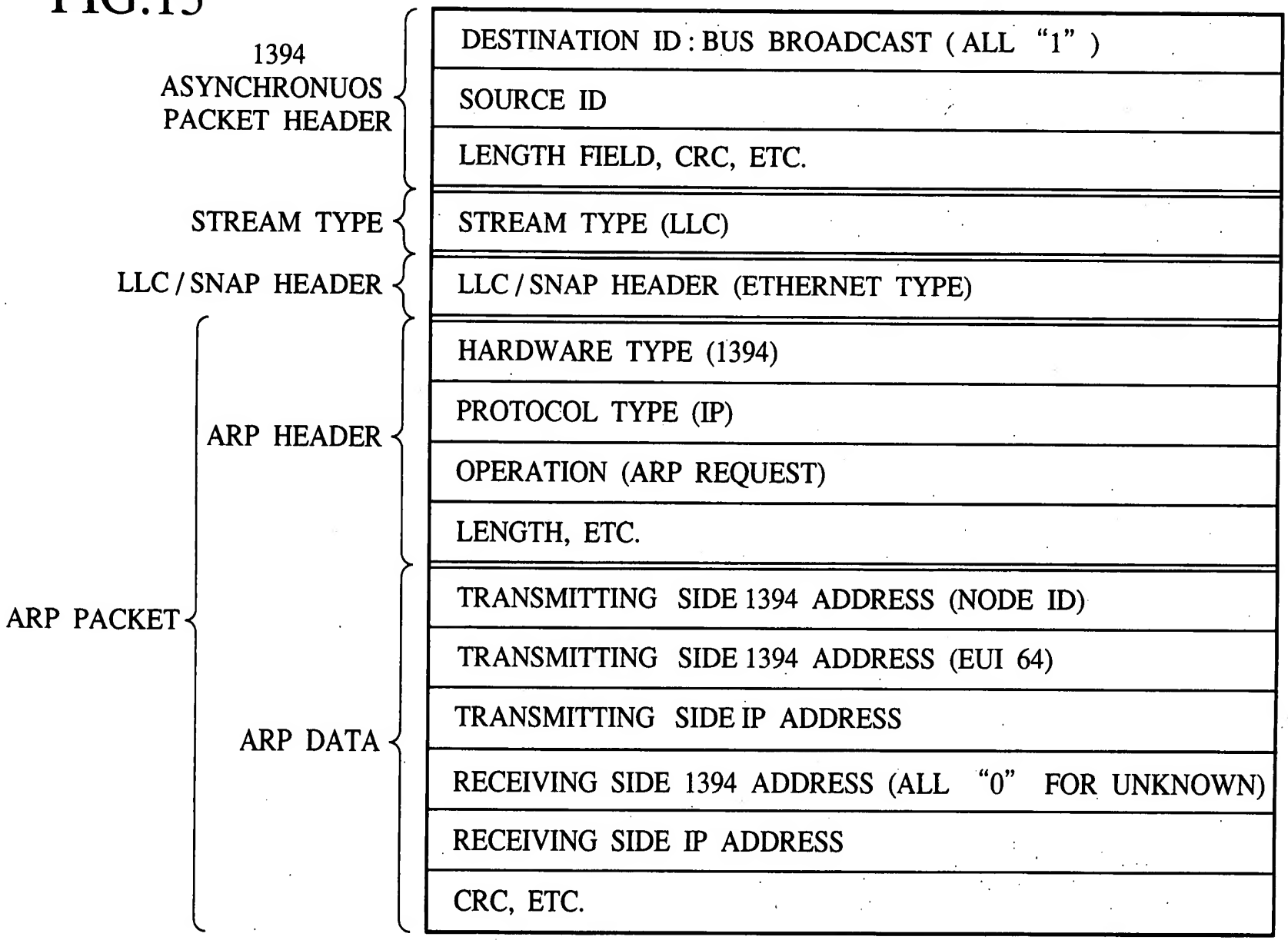


FIG.14

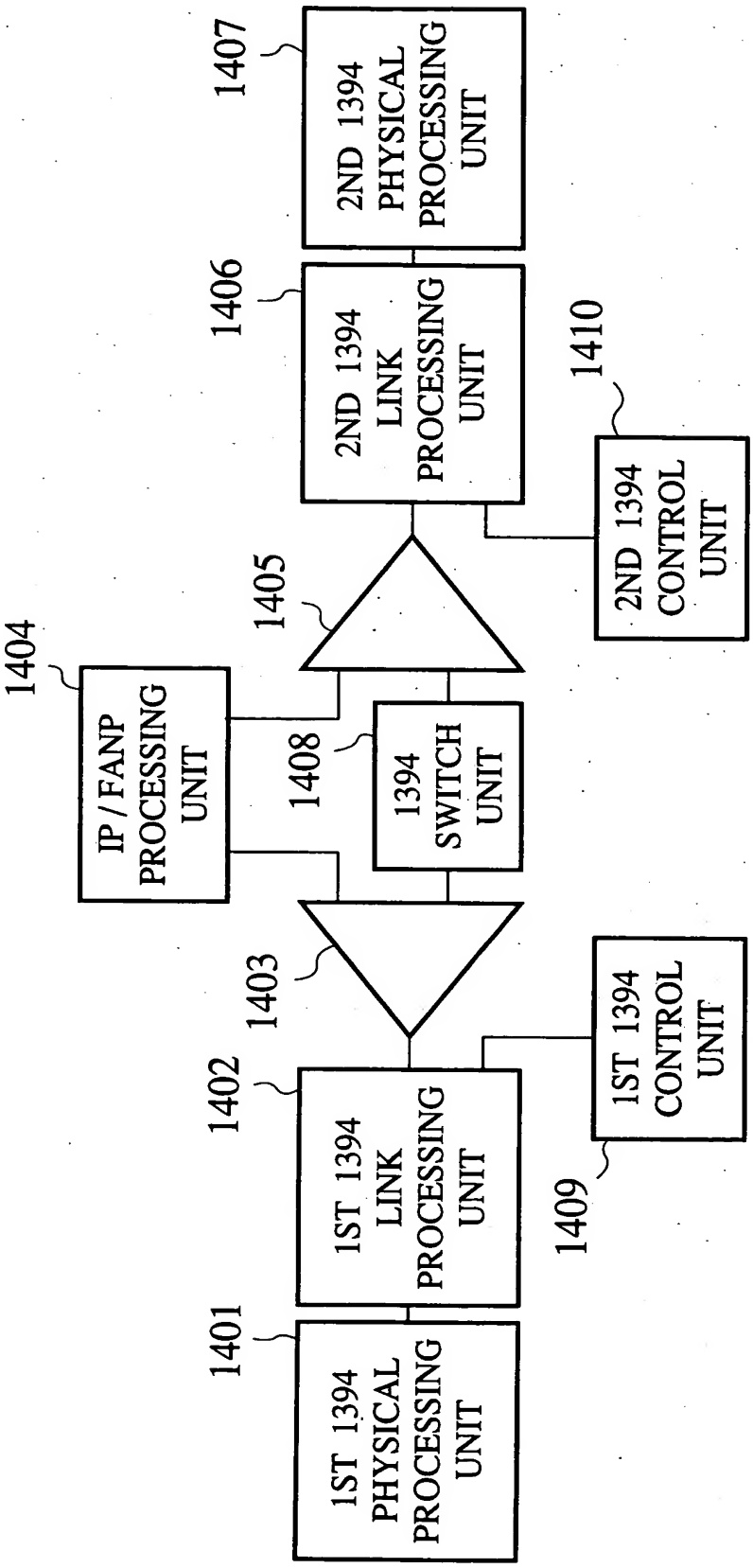

1401
1ST 1394 PHYSICAL PROCESSING UNIT
1402
1ST 1394 LINK PROCESSING UNIT
1403
1404
IP/FANP PROCESSING UNIT
1405
1406
2ND 1394 LINK PROCESSING UNIT
1407
2ND 1394 PHYSICAL PROCESSING UNIT
1408
1394 SWITCH UNIT
1409
1ST 1394 CONTROL UNIT
1410
2ND 1394 CONTROL UNIT

FIG.15

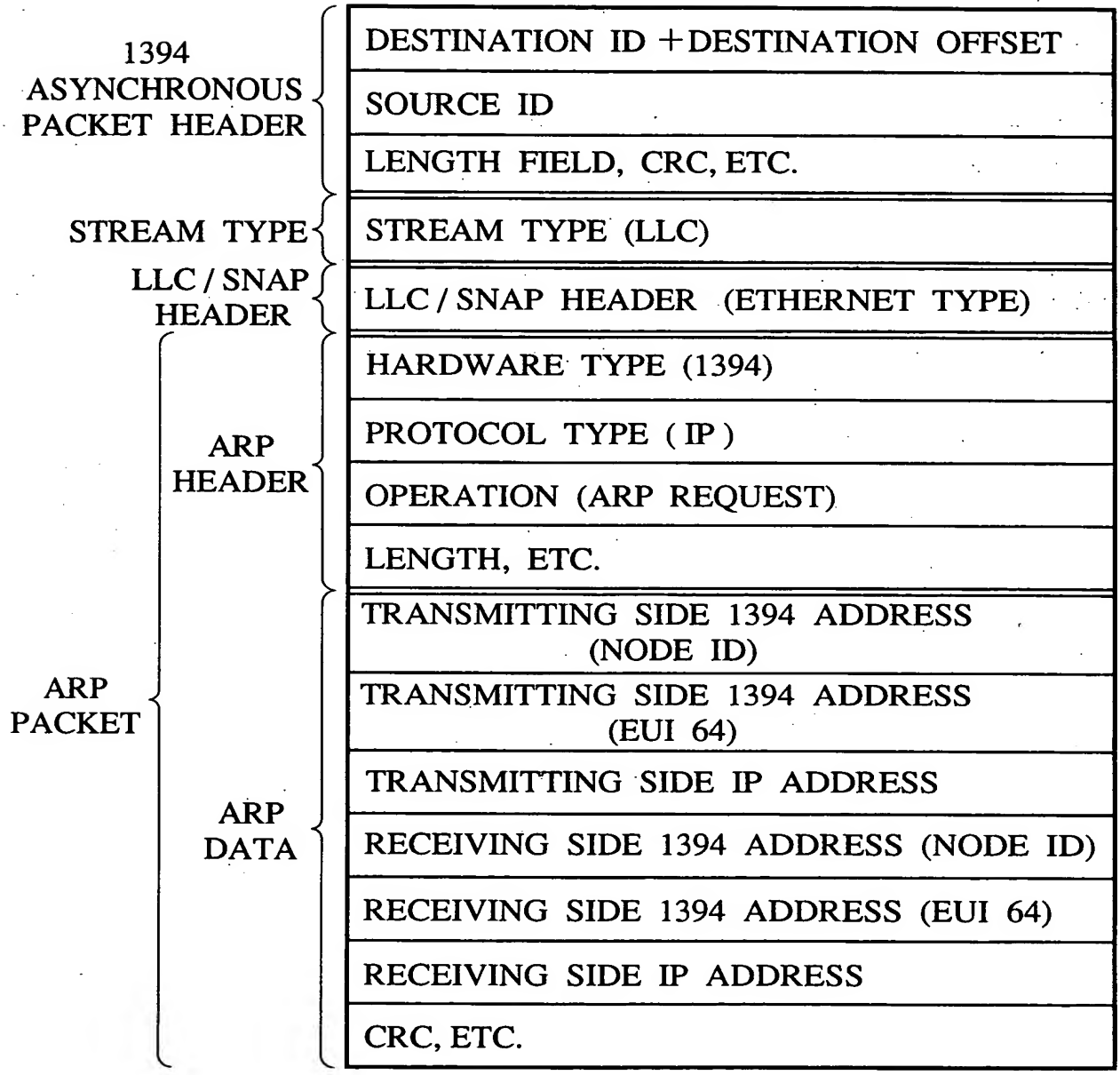

1394 ASYNCHRONOUS PACKET HEADER
DESTINATION ID +DESTINATION OFFSET
SOURCE ID
LENGTH FIELD, CRC, ETC.
STREAM TYPE
STREAM TYPE (LLC)
LLC / SNAP HEADER
LLC / SNAP HEADER (ETHERNET TYPE)
ARP PACKET
ARP HEADER
HARDWARE TYPE (1394)
PROTOCOL TYPE (IP)
OPERATION (ARP REQUEST)
LENGTH, ETC.
ARP DATA
TRANSMITTING SIDE 1394 ADDRESS (NODE ID)
TRANSMITTING SIDE 1394 ADDRESS (EUI 64)
TRANSMITTING SIDE IP ADDRESS
RECEIVING SIDE 1394 ADDRESS (NODE ID)
RECEIVING SIDE 1394 ADDRESS (EUI 64)
RECEIVING SIDE IP ADDRESS
CRC, ETC.

FIG.16

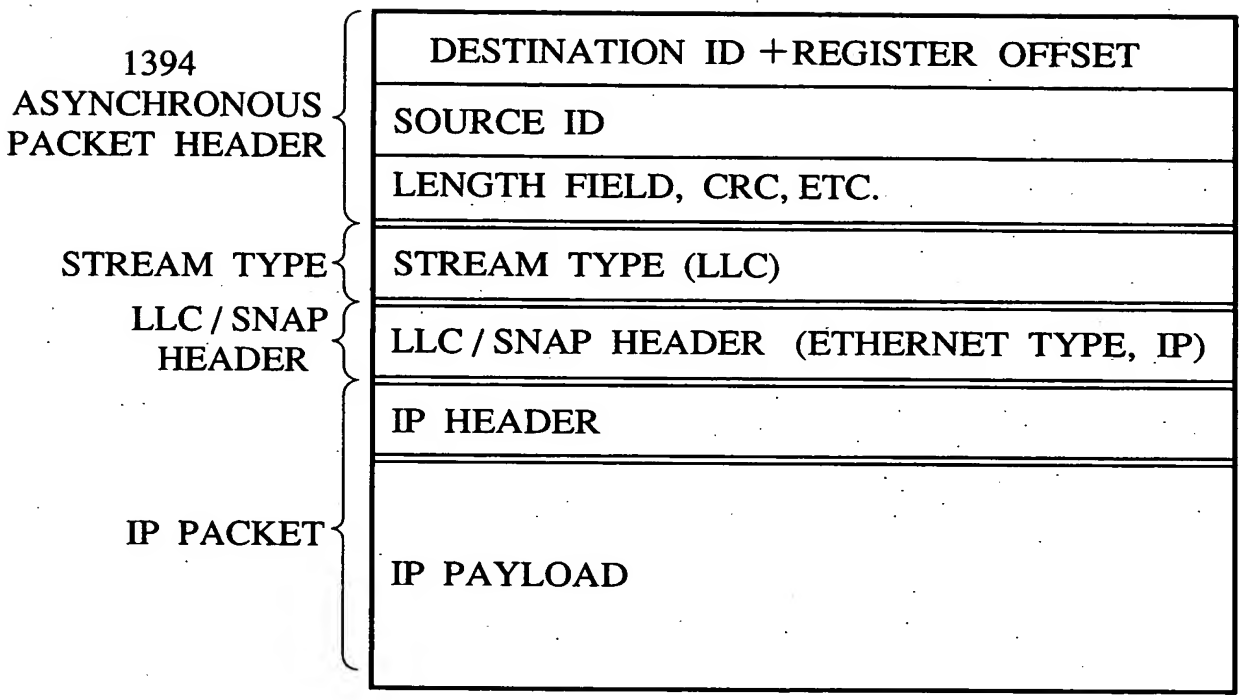

1394 ASYNCHRONOUS PACKET HEADER
STREAM TYPE
LLC / SNAP HEADER
IP PACKET
DESTINATION ID +REGISTER OFFSET
SOURCE ID
LENGTH FIELD, CRC, ETC.
STREAM TYPE (LLC)
LLC / SNAP HEADER (ETHERNET TYPE, IP)
IP HEADER
IP PAYLOAD

FIG.17

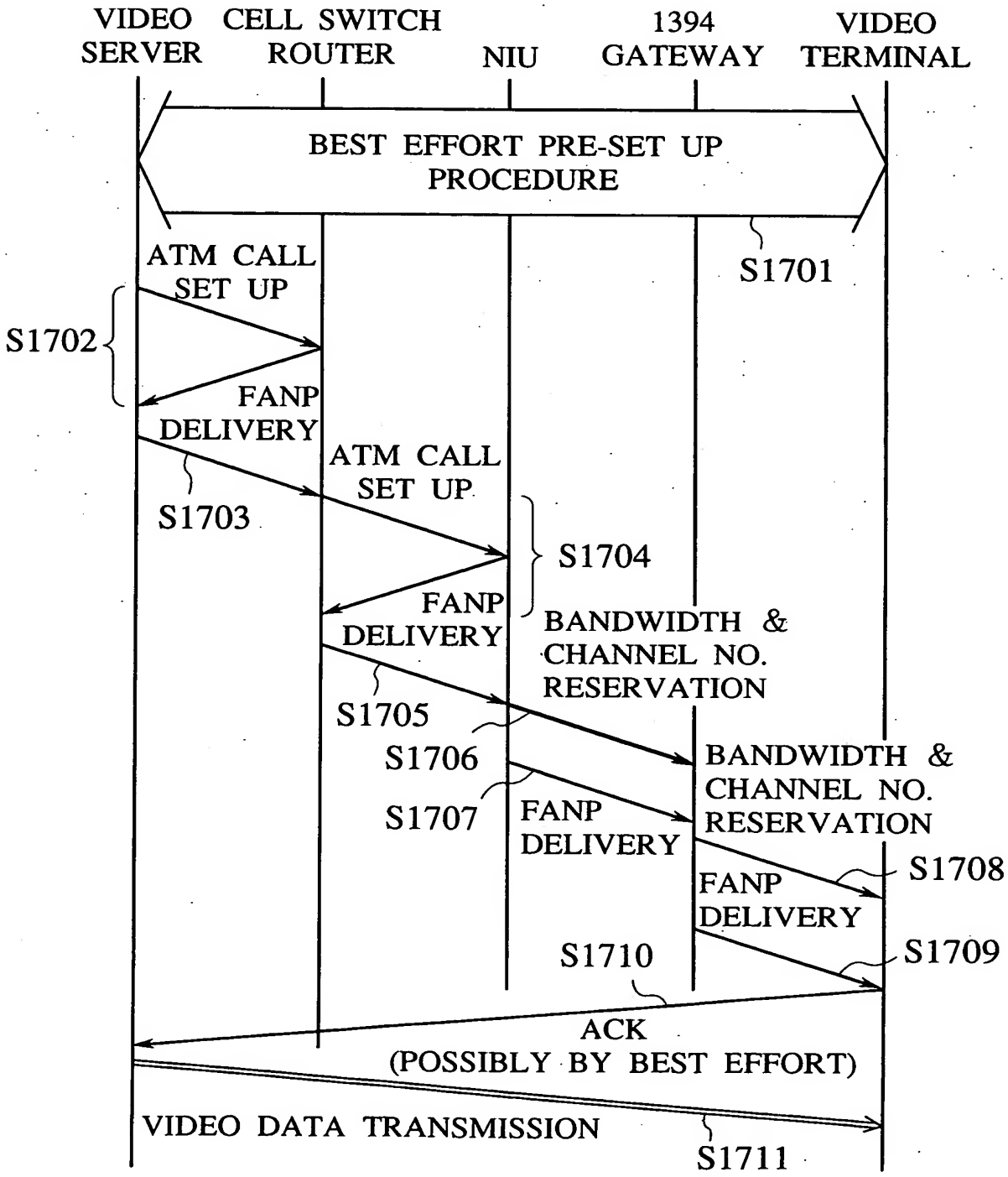

VIDEO SERVER
CELL SWITCH ROUTER
NIU
1394 GATEWAY
VIDEO TERMINAL
BEST EFFORT PRE-SET UP PROCEDURE
S1701
ATM CALL SET UP
S1702
FANP DELIVERY
S1703
ATM CALL SET UP
S1704
FANP DELIVERY
BANDWIDTH & CHANNEL NO. RESERVATION
S1705
S1706
S1707
FANP DELIVERY
BANDWIDTH & CHANNEL NO. RESERVATION
S1708
FANP DELIVERY
S1709
S1710
ACK
(POSSIBLY BY BEST EFFORT)
VIDEO DATA TRANSMISSION
S1711

FIG.18

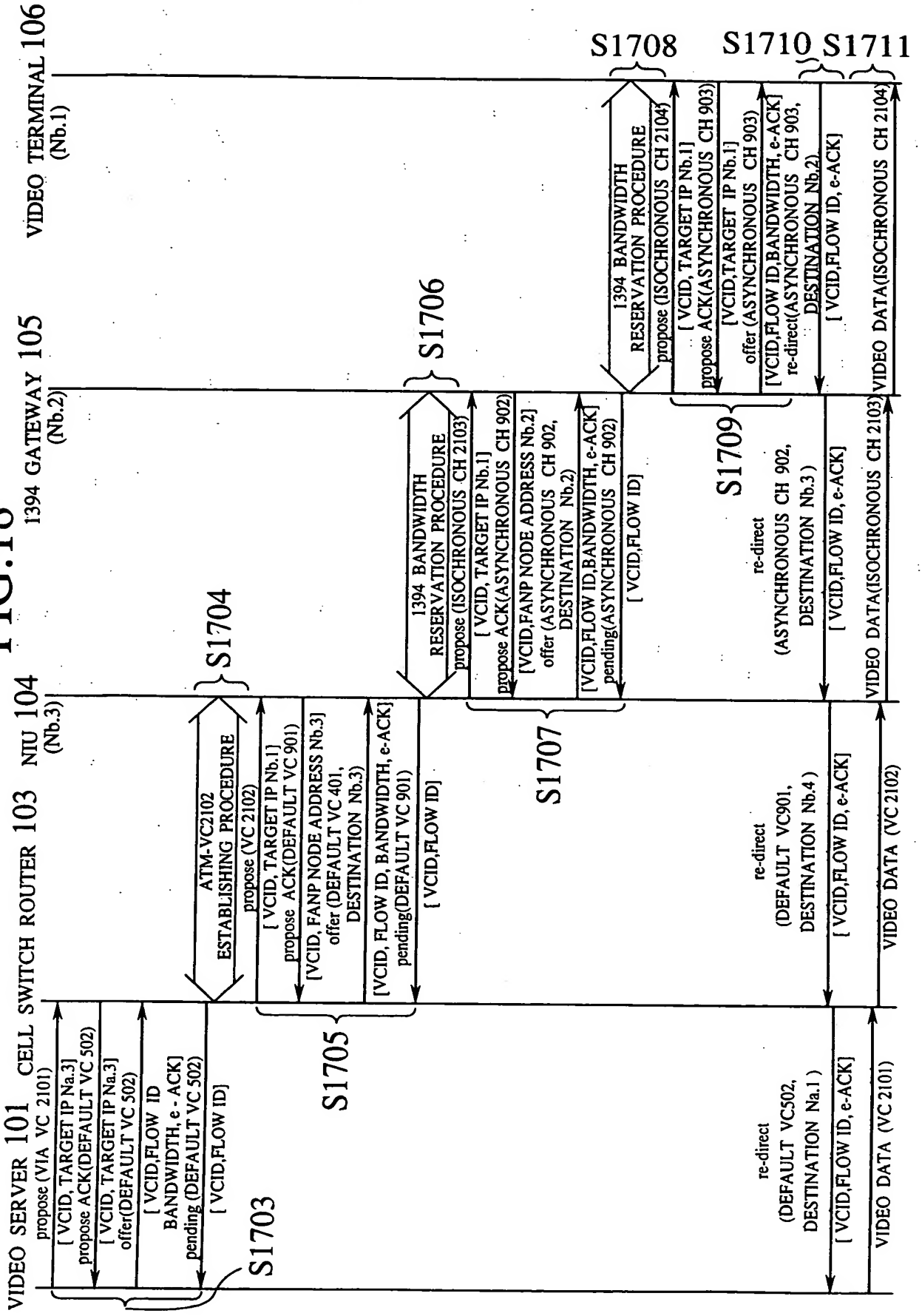

VIDEO SERVER 101
CELL SWITCH ROUTER 103
NIU 104 (Nb.3)
1394 GATEWAY 105 (Nb.2)
VIDEO TERMINAL 106 (Nb.1)
S1703
S1704
S1705
S1706
S1707
S1708
S1709
S1710
S1711
propose (VIA VC 2101)
[VCID, TARGET IP Na.3]
propose ACK(DEFAULT VC 502)
[VCID, TARGET IP Na.3]
offer(DEFAULT VC 502)
[VCID,FLOW ID
BANDWIDTH, e - ACK]
pending (DEFAULT VC 502)
[VCID,FLOW ID]
ATM-VC2102
ESTABLISHING PROCEDURE
propose (VC 2102)
[VCID, TARGET IP Nb.1]
propose ACK(DEFAULT VC 901)
[VCID, FANP NODE ADDRESS Nb.3]
offer (DEFAULT VC 401,
DESTINATION Nb.3)
[VCID, FLOW ID, BANDWIDTH, e-ACK]
pending(DEFAULT VC 901)
[VCID,FLOW ID]
1394 BANDWIDTH
RESERVATION PROCEDURE
propose (ISOCHRONOUS CH 2103)
[VCID, TARGET IP Nb.1]
propose ACK(ASYNCHRONOUS CH 902)
[VCID,FANP NODE ADDRESS Nb.2]
offer (ASYNCHRONOUS CH 902,
DESTINATION Nb.2)
[VCID,FLOW ID,BANDWIDTH, e-ACK]
pending(ASYNCHRONOUS CH 902)
[VCID,FLOW ID]
re-direct
(DEFAULT VC502,
DESTINATION Na.1)
[VCID,FLOW ID, e-ACK]
VIDEO DATA (VC 2101)
re-direct
(DEFAULT VC901,
DESTINATION Nb.4)
[VCID,FLOW ID, e-ACK]
VIDEO DATA (VC 2102)
re-direct
(ASYNCHRONOUS CH 902,
DESTINATION Nb.3)
[VCID,FLOW ID, e-ACK]
VIDEO DATA(ISOCHRONOUS CH 2103)
1394 BANDWIDTH
RESERVATION PROCEDURE
propose (ISOCHRONOUS CH 2104)
[VCID, TARGET IP Nb.1]
propose ACK(ASYNCHRONOUS CH 903)
[VCID,TARGET IP Nb.1]
offer (ASYNCHRONOUS CH 903)
[VCID,FLOW ID,BANDWIDTH, e-ACK]
re-direct(ASYNCHRONOUS CH 903,
DESTINATION Nb.2)
[VCID,FLOW ID, e-ACK]
VIDEO DATA(ISOCHRONOUS CH 2104)

FIG.19

INPUT CHANNEL NO. OR REGISTER OFFSET	ATTRIBUTE	OUTPUT PORT	OUTPUT CHANNEL NO. OR DESTINATION ADDRESS WITH REGISTER OFFSET
#1	MPEG, 4M	B	#5
#3	MPEG, 4M	B	#7
#5	AUDIO, 1M	B	#2
⋮	⋮	⋮	⋮

FIG.20

HAEDWARE TYPE (ATM)
PROTOCOL TYPE (IP)
OPERATION CODE (propose / propose ACK / NACK)
SENDER IP ADDRESS
TARGET IP ADDRESS OR FANP TERMINATING NODE IP ADDRESS
VCID

FIG.21

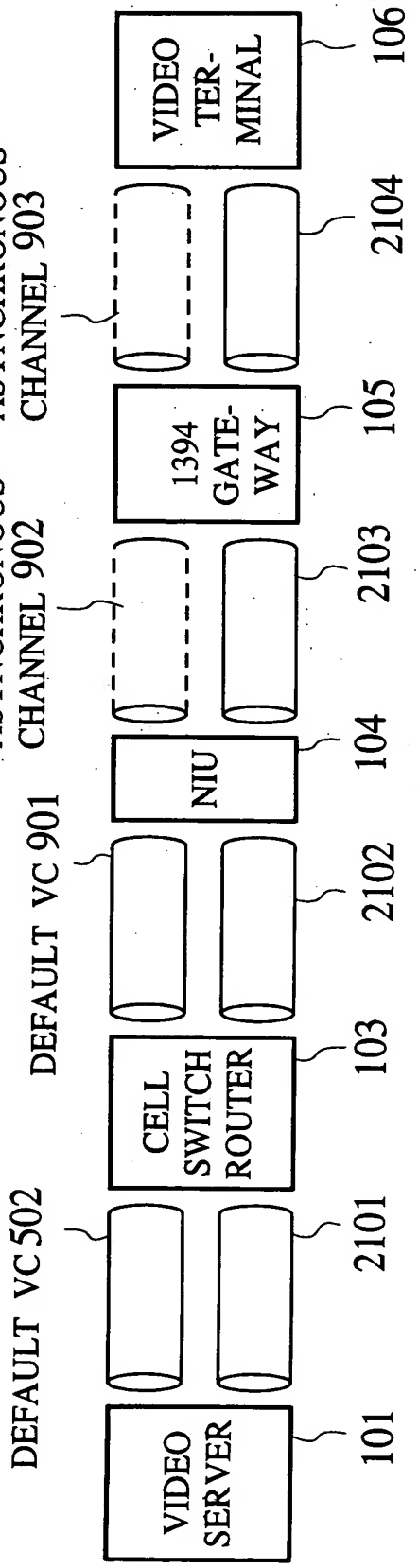

VIDEO SERVER
101
DEFAULT VC 502
2101
CELL SWITCH ROUTER
103
DEFAULT VC 901
2102
NIU
104
ASYNCHRONOUS CHANNEL 902
2103
1394 GATE-WAY
105
ASYNCHRONOUS CHANNEL 903
2104
VIDEO TER-MINAL
106

FIG.22

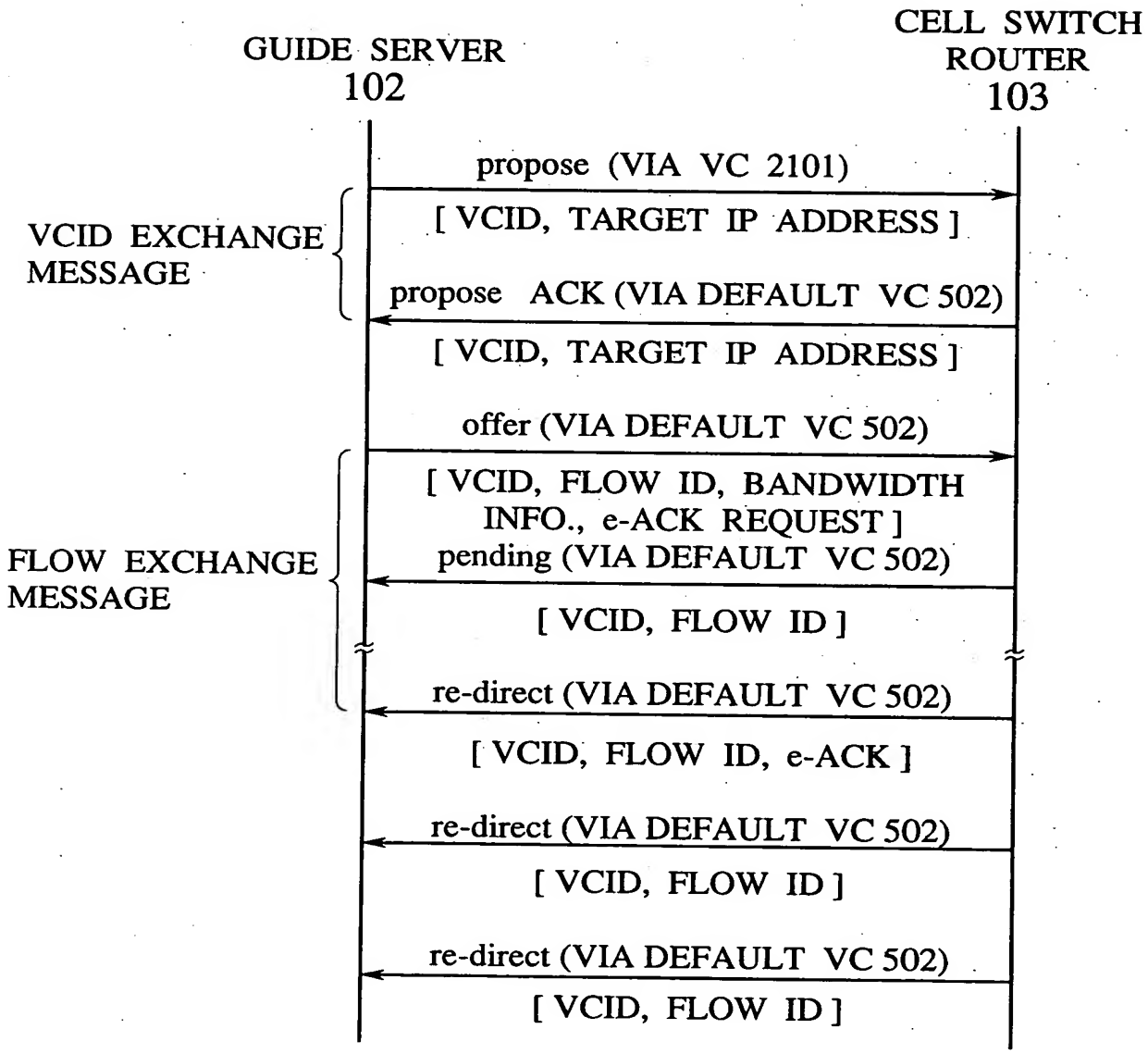

GUIDE SERVER
102
CELL SWITCH
ROUTER
103
propose (VIA VC 2101)
[VCID, TARGET IP ADDRESS]
VCID EXCHANGE
MESSAGE
propose ACK (VIA DEFAULT VC 502)
[VCID, TARGET IP ADDRESS]
offer (VIA DEFAULT VC 502)
[VCID, FLOW ID, BANDWIDTH
INFO., e-ACK REQUEST]
pending (VIA DEFAULT VC 502)
FLOW EXCHANGE
MESSAGE
[VCID, FLOW ID]
re-direct (VIA DEFAULT VC 502)
[VCID, FLOW ID, e-ACK]
re-direct (VIA DEFAULT VC 502)
[VCID, FLOW ID]
re-direct (VIA DEFAULT VC 502)
[VCID, FLOW ID]

FIG.23

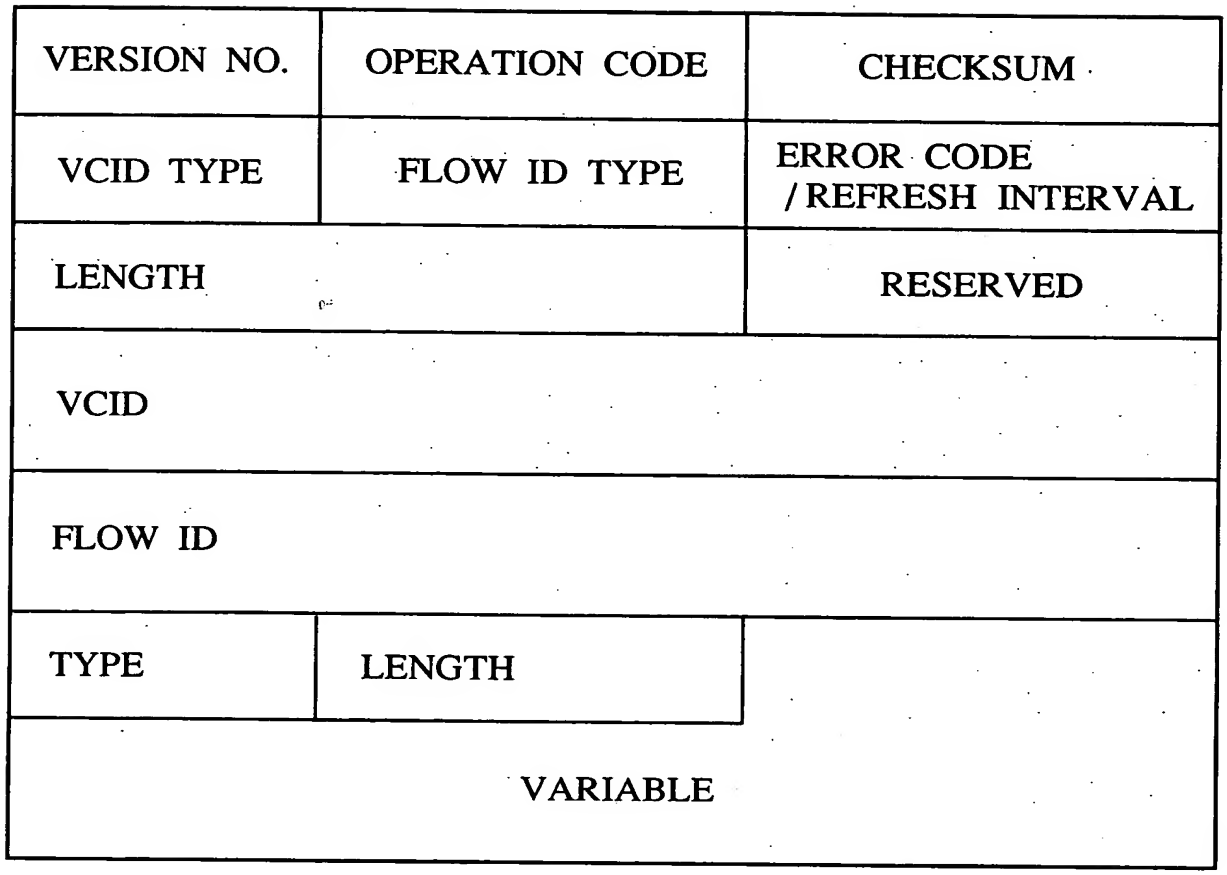

VERSION NO.
OPERATION CODE
CHECKSUM
VCID TYPE
FLOW ID TYPE
ERROR CODE /REFRESH INTERVAL
LENGTH
RESERVED
VCID
FLOW ID
TYPE
LENGTH
VARIABLE

FIG.24

VERSION=2	OPERATION CODE=1	RESERVED
VCID TYPE	FLOW ID TYPE	RERESH INTERVAL
LENGTH		RESERVED
VCID		
FLOW ID		
TYPE	LENGTH	COMMUNICATION ATTRIBUTE (MPEG)
TYPE	LENGTH	BANDWIDTH (COMMUNICATION QUALITY)
TYPE	LENGTH	e-ACK REQUEST

FIG.25

VERSION=2	OPERATION CODE=6	RESERVED
VCID TYPE	FLOW ID TYPE	RESERVED
LENGTH		RESERVED
VCID		
FLOW ID		

FIG.26

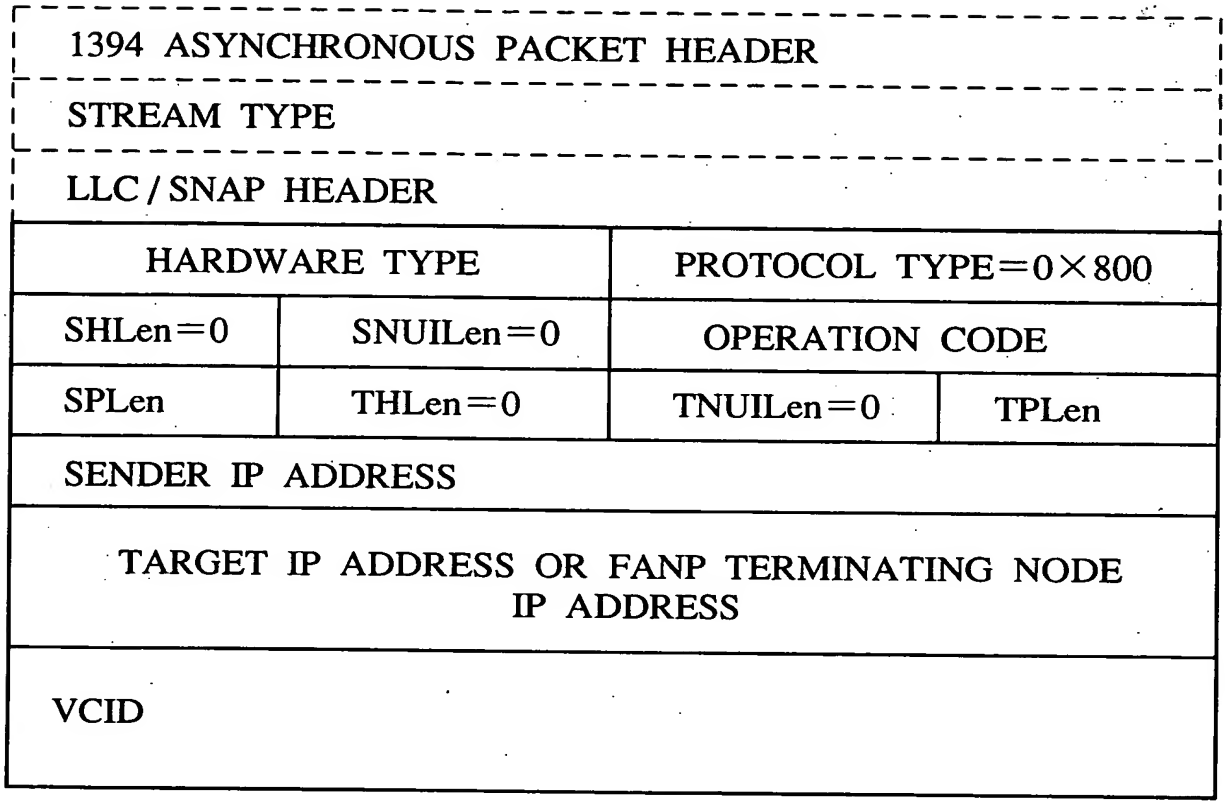

1394 ASYNCHRONOUS PACKET HEADER
STREAM TYPE
LLC / SNAP HEADER
HARDWARE TYPE
PROTOCOL TYPE=0×800
SHLen=0
SNUILen=0
OPERATION CODE
SPLen
THLen=0
TNUILen=0
TPLen
SENDER IP ADDRESS
TARGET IP ADDRESS OR FANP TERMINATING NODE IP ADDRESS
VCID

FIG.27

	VERSION=2	OPERATION CODE=1	RESERVED
	VCID TYPE	FLOW ID TYPE	RESERVED
	LENGTH		RESERVED
	VCID		
	FLOW ID		
OPTION	TYPE	LENGTH	e - ACK RESPONSE

FIG.28

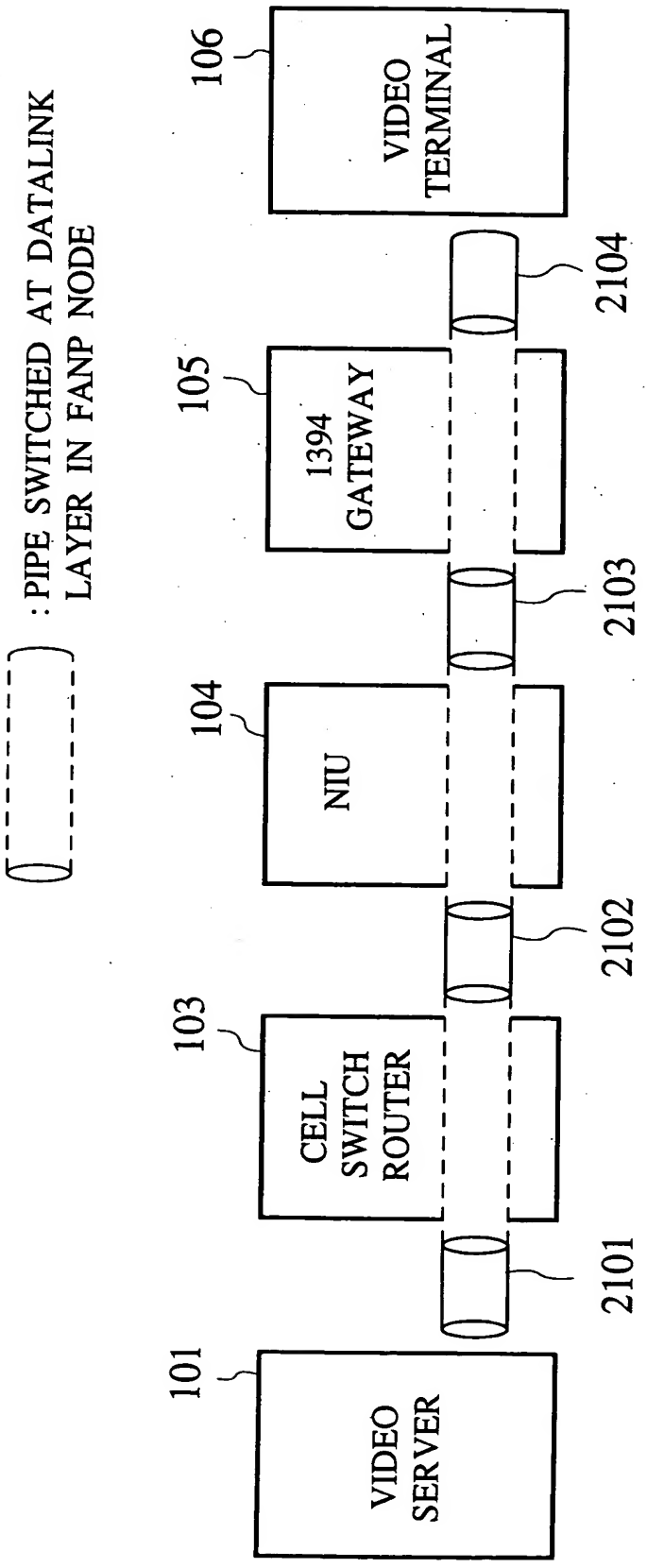

: PIPE SWITCHED AT DATALINK LAYER IN FANP NODE
101
VIDEO SERVER
103
CELL SWITCH ROUTER
104
NIU
105
1394 GATEWAY
106
VIDEO TERMINAL
2101
2102
2103
2104

FIG.29

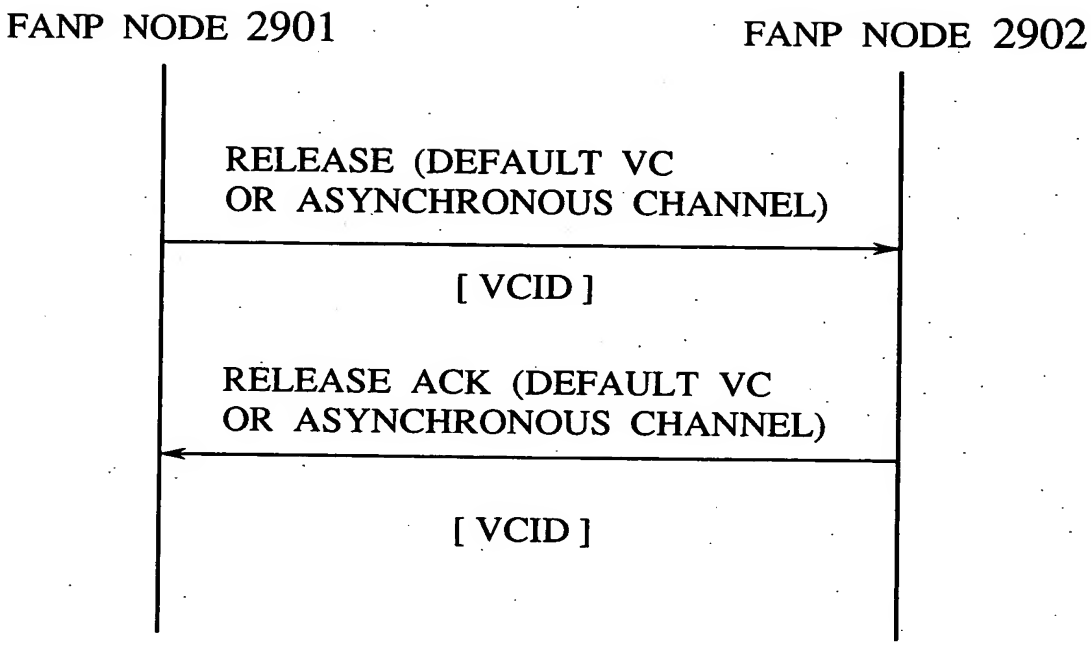

FANP NODE 2901
FANP NODE 2902
RELEASE (DEFAULT VC
OR ASYNCHRONOUS CHANNEL)
[VCID]
RELEASE ACK (DEFAULT VC
OR ASYNCHRONOUS CHANNEL)
[VCID]

FIG.30

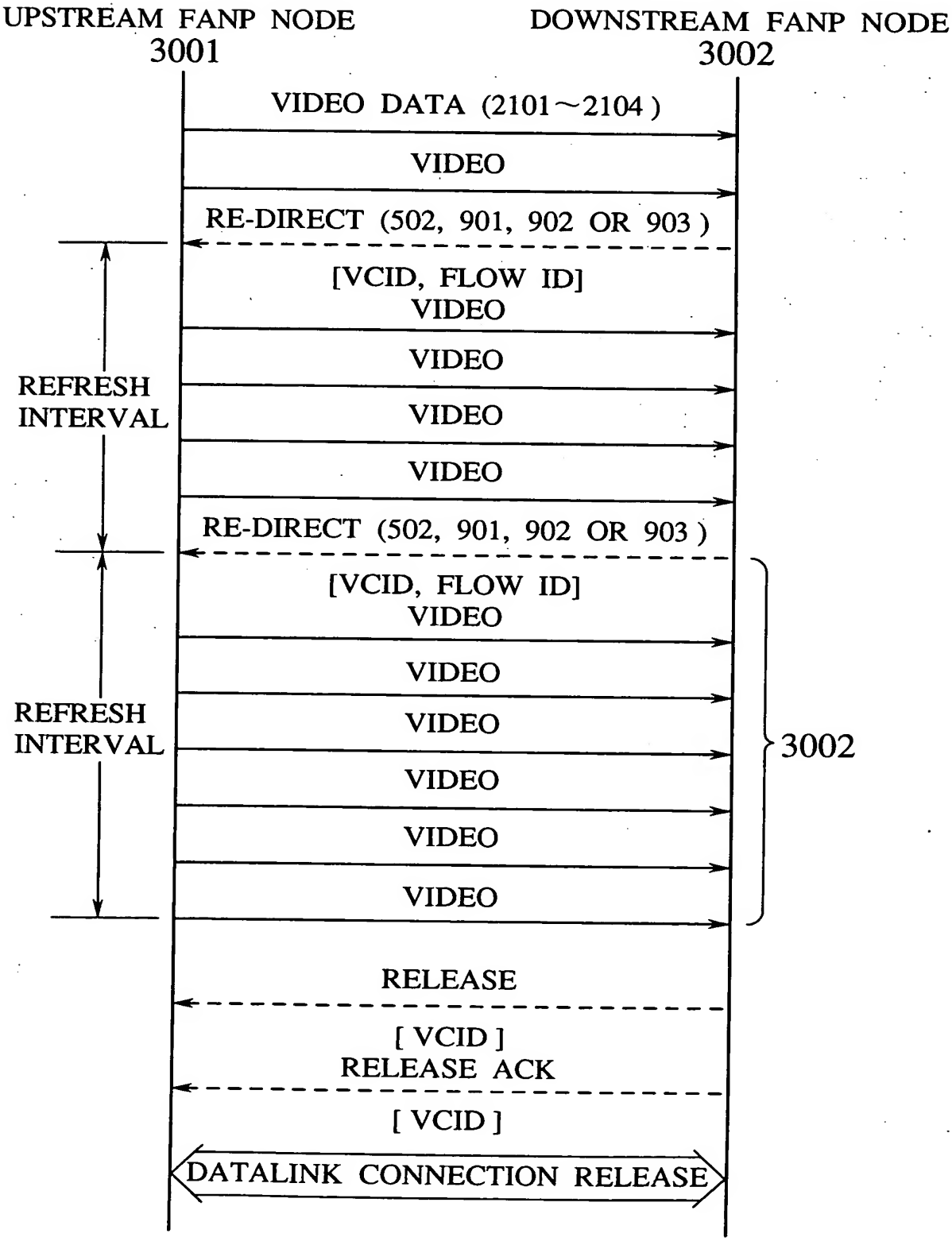

UPSTREAM FANP NODE
3001
DOWNSTREAM FANP NODE
3002
VIDEO DATA (2101~2104)
VIDEO
RE-DIRECT (502, 901, 902 OR 903)
[VCID, FLOW ID]
VIDEO
VIDEO
VIDEO
VIDEO
REFRESH INTERVAL
RE-DIRECT (502, 901, 902 OR 903)
[VCID, FLOW ID]
VIDEO
VIDEO
VIDEO
VIDEO
VIDEO
VIDEO
REFRESH INTERVAL
3002
RELEASE
[VCID]
RELEASE ACK
[VCID]
DATALINK CONNECTION RELEASE

FIG.31

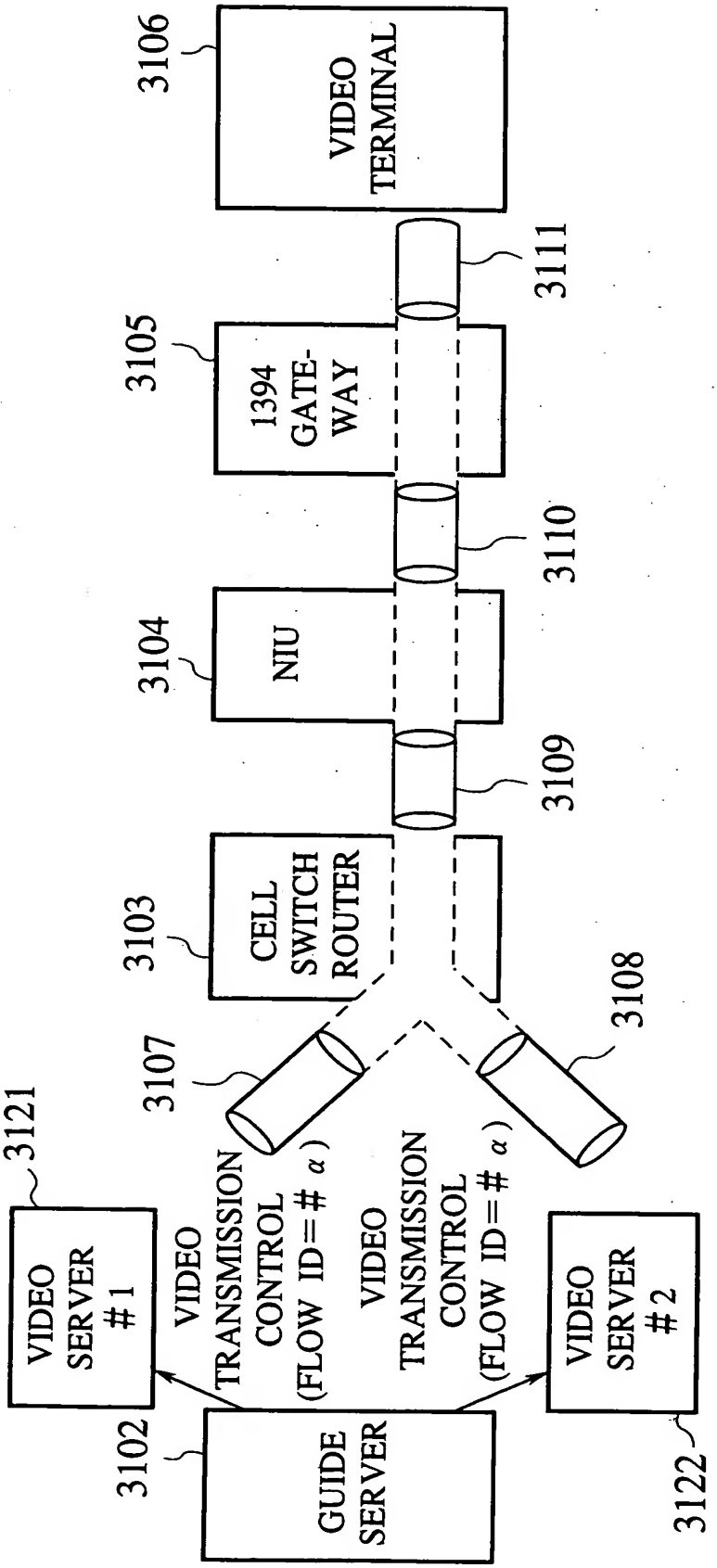

3106
VIDEO TERMINAL
3111
3105
1394 GATE-WAY
3110
3104
NIU
3109
3103
CELL SWITCH ROUTER
3107
3108
3121
VIDEO SERVER #1
VIDEO TRANSMISSION CONTROL (FLOW ID=# α)
VIDEO TRANSMISSION CONTROL (FLOW ID=# α)
VIDEO SERVER #2
3102
GUIDE SERVER
3122

FIG.32

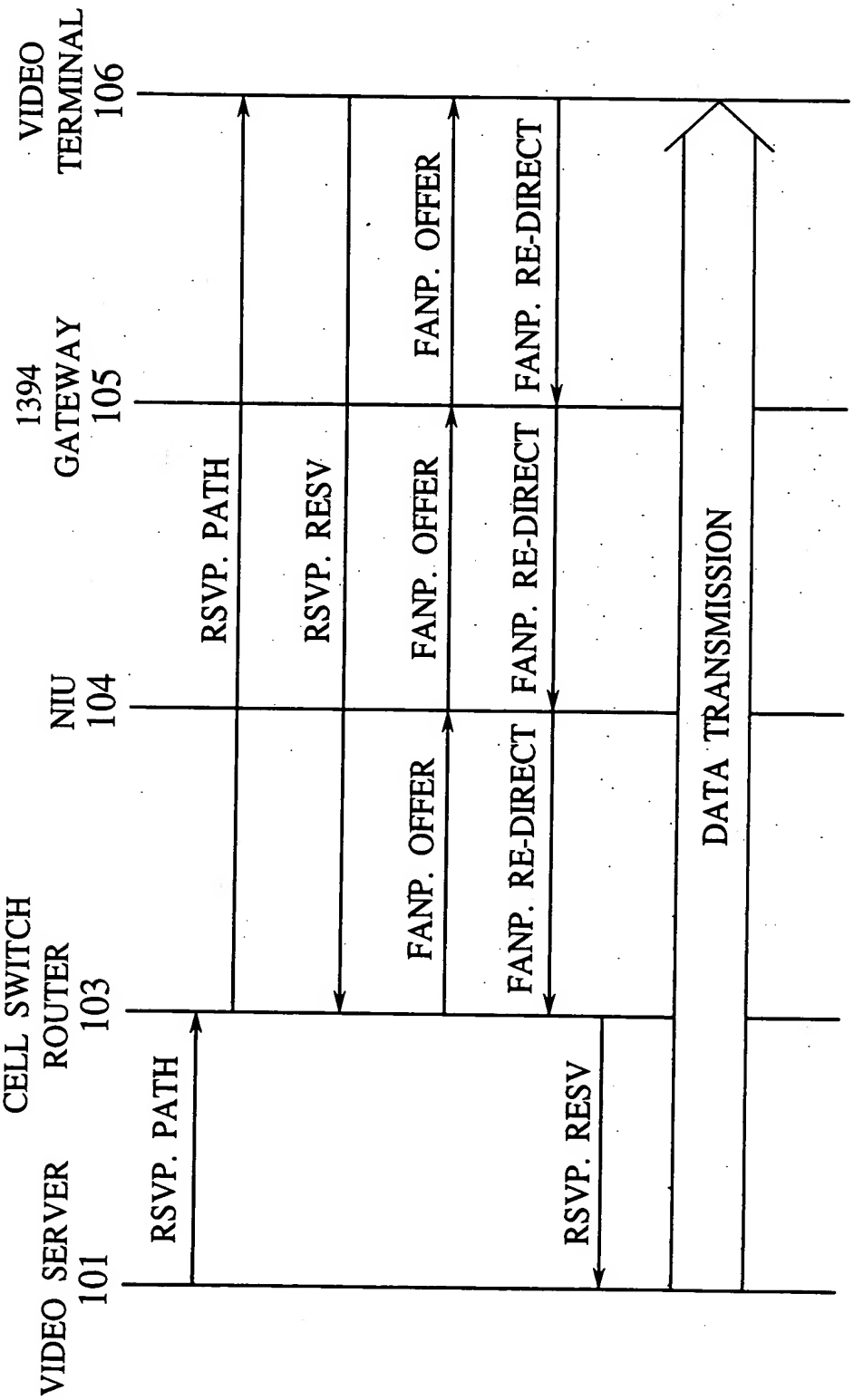

VIDEO SERVER 101
CELL SWITCH ROUTER 103
NIU 104
1394 GATEWAY 105
VIDEO TERMINAL 106
RSVP. PATH
RSVP. RESV
FANP. OFFER
FANP. RE-DIRECT
DATA TRANSMISSION

FIG.33

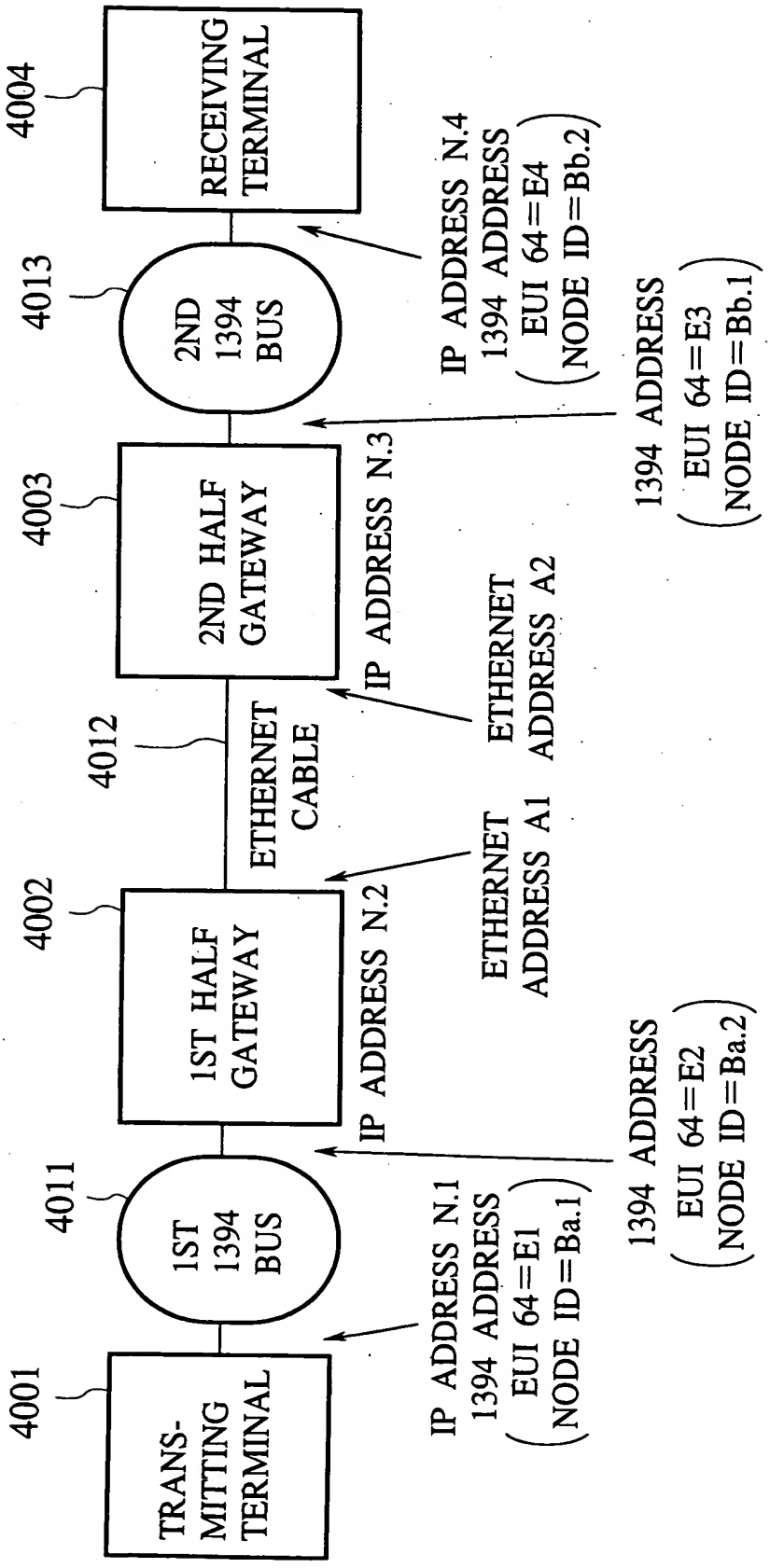

4001
TRANS-MITTING TERMINAL
4011
1ST 1394 BUS
4002
1ST HALF GATEWAY
4012
ETHERNET CABLE
4003
2ND HALF GATEWAY
4013
2ND 1394 BUS
4004
RECEIVING TERMINAL
IP ADDRESS N.1
1394 ADDRESS
EUI 64=E1
NODE ID=Ba.1
IP ADDRESS N.2
ETHERNET ADDRESS A1
1394 ADDRESS
EUI 64=E2
NODE ID=Ba.2
IP ADDRESS N.3
ETHERNET ADDRESS A2
1394 ADDRESS
EUI 64=E3
NODE ID=Bb.1
IP ADDRESS N.4
1394 ADDRESS
EUI 64=E4
NODE ID=Bb.2

FIG.34

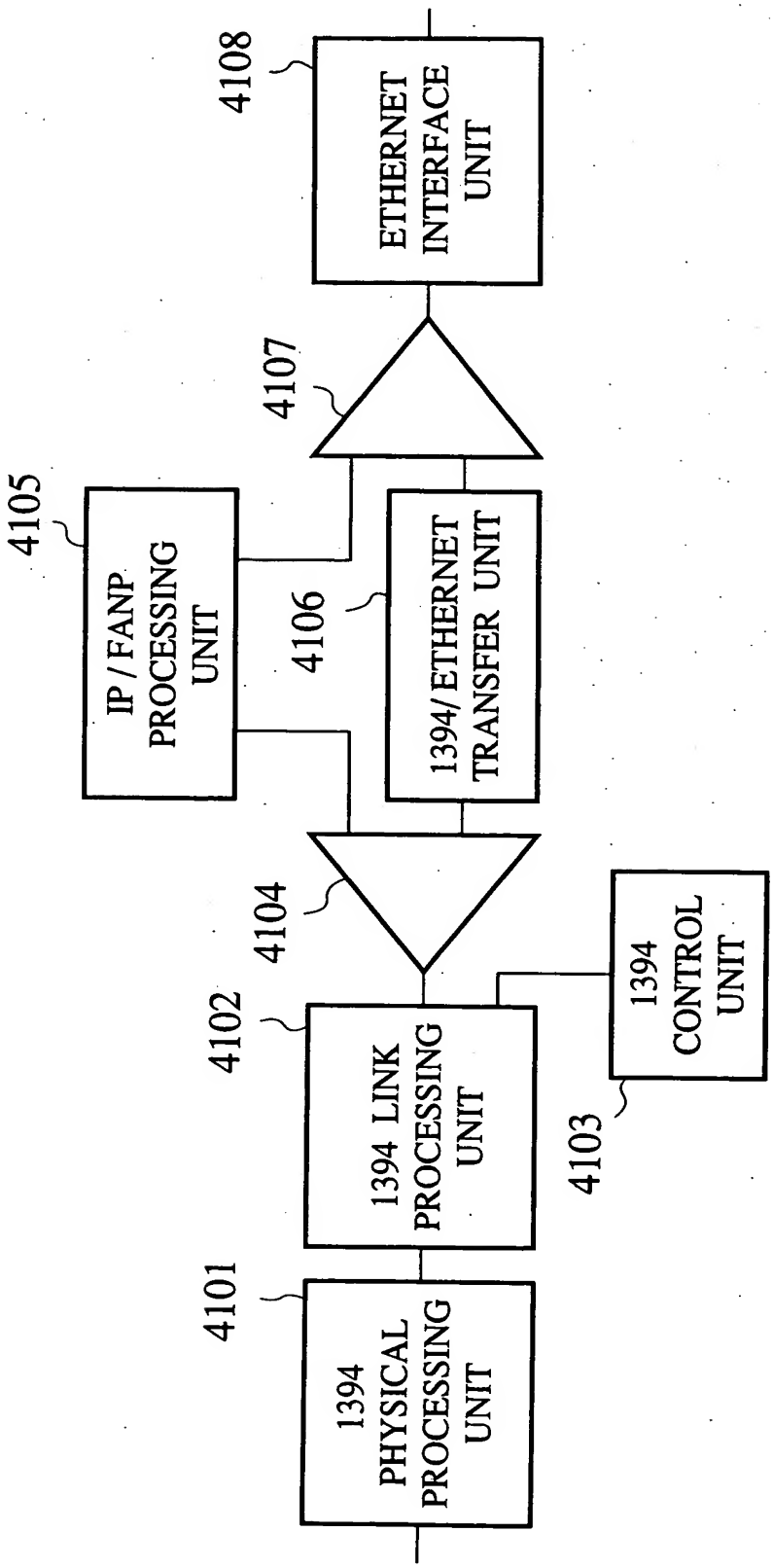

4108
ETHERNET INTERFACE UNIT
4107
4105
IP / FANP PROCESSING UNIT
4106
1394/ETHERNET TRANSFER UNIT
4104
4102
1394 LINK PROCESSING UNIT
1394 CONTROL UNIT
4103
4101
1394 PHYSICAL PROCESSING UNIT

FIG.35

INPUT CHANNEL NO. OR DESTINATION ADDRESS WITH SPECIFIC REGISTER OFFSET	ATTRIBUTE	OUTPUT PORT	OUTPUT MAC ADDRESS
#1	MPEG, 4M	B	#A
#4	AUDIO, 1M	B	#B

FIG.36

INPUT MAC ADDRESS	ATTRIBUTE	OUTPUT PORT	OUTPUT CHANNEL NO. OR DESTINATION ADDRESS WITH SPECIFIC REGISTER OFFSET
#A	MPEG, 4M	B	#1
#B	AUDIO, 1M	B	#3

FIG.37

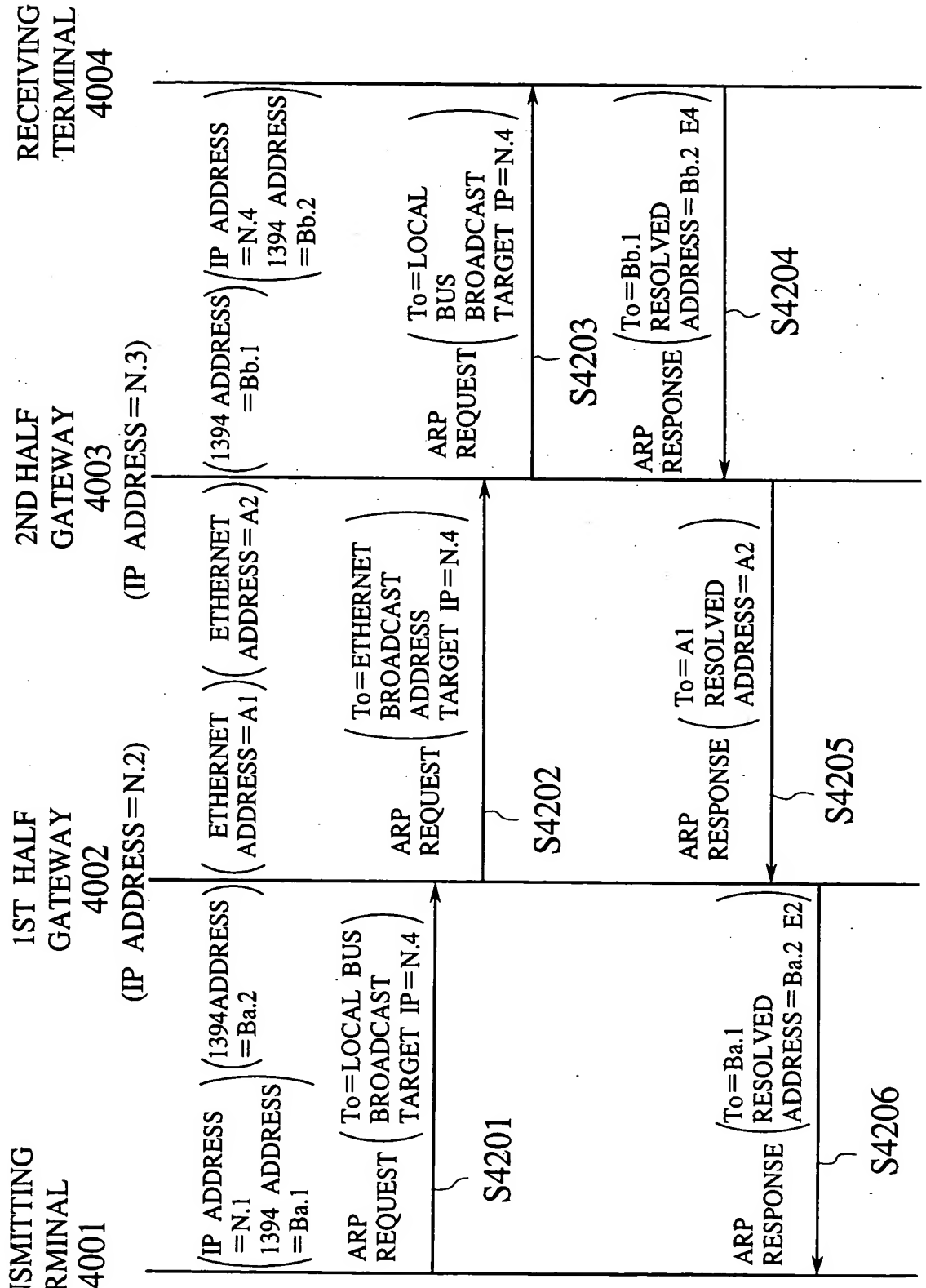
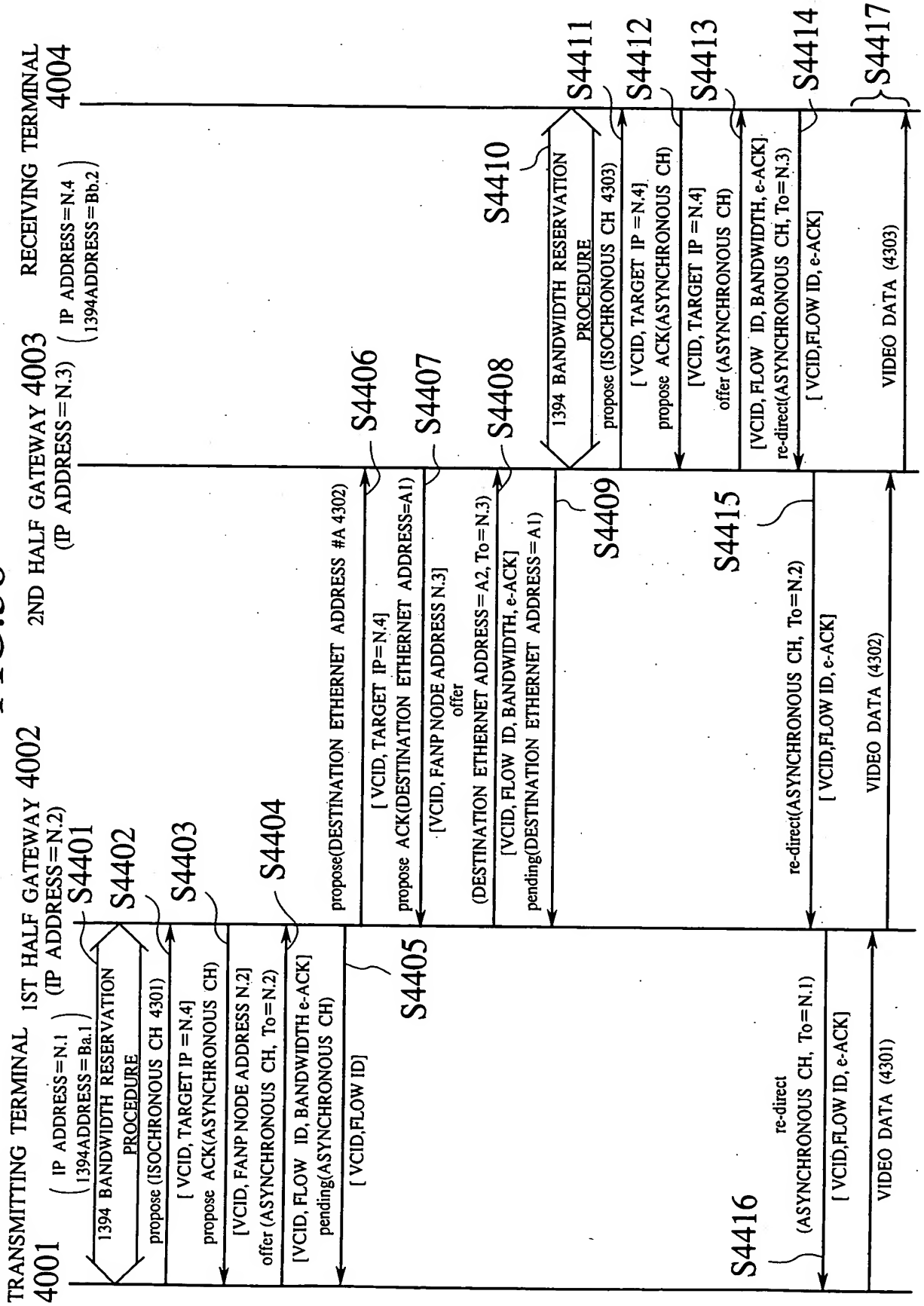

TRANSMITTING TERMINAL 4001
1ST HALF GATEWAY 4002 (IP ADDRESS=N.2)
2ND HALF GATEWAY 4003 (IP ADDRESS=N.3)
RECEIVING TERMINAL 4004
(IP ADDRESS =N.1 1394 ADDRESS =Ba.1)
(1394ADDRESS =Ba.2)
(ETHERNET ADDRESS=A1)
(ETHERNET ADDRESS=A2)
(1394 ADDRESS =Bb.1)
(IP ADDRESS =N.4 1394 ADDRESS =Bb.2)
ARP REQUEST
(To=LOCAL BUS BROADCAST TARGET IP=N.4)
S4201
ARP REQUEST
(To=ETHERNET BROADCAST ADDRESS TARGET IP=N.4)
S4202
ARP REQUEST
(To=LOCAL BUS BROADCAST TARGET IP=N.4)
S4203
ARP RESPONSE
(To=Bb.1 RESOLVED ADDRESS=Bb.2 E4)
S4204
ARP RESPONSE
(To=A1 RESOLVED ADDRESS=A2)
S4205
ARP RESPONSE
(To=Ba.1 RESOLVED ADDRESS=Ba.2 E2)
S4206

FIG.38


TRANSMITTING TERMINAL 4001
1ST HALF GATEWAY 4002 (IP ADDRESS=N.2)
2ND HALF GATEWAY 4003 (IP ADDRESS=N.3)
RECEIVING TERMINAL 4004
(IP ADDRESS=N.1 1394ADDRESS=Ba.1)
(IP ADDRESS=N.4 1394ADDRESS=Bb.2)
S4401
S4402
S4403
S4404
S4405
S4406
S4407
S4408
S4409
S4410
S4411
S4412
S4413
S4414
S4415
S4416
S4417
1394 BANDWIDTH RESERVATION PROCEDURE
propose (ISOCHRONOUS CH 4301)
[VCID, TARGET IP =N.4]
propose ACK(ASYNCHRONOUS CH)
[VCID, FANP NODE ADDRESS N.2]
offer (ASYNCHRONOUS CH, To=N.2)
[VCID, FLOW ID, BANDWIDTH e-ACK]
pending(ASYNCHRONOUS CH)
[VCID,FLOW ID]
propose(DESTINATION ETHERNET ADDRESS #A 4302)
[VCID, TARGET IP=N.4]
propose ACK(DESTINATION ETHERNET ADDRESS=A1)
[VCID, FANP NODE ADDRESS N.3]
offer
(DESTINATION ETHERNET ADDRESS=A2, To=N.3)
[VCID, FLOW ID, BANDWIDTH, e-ACK]
pending(DESTINATION ETHERNET ADDRESS=A1)
1394 BANDWIDTH RESERVATION PROCEDURE
propose (ISOCHRONOUS CH 4303)
[VCID, TARGET IP =N.4]
propose ACK(ASYNCHRONOUS CH)
[VCID, TARGET IP =N.4]
offer (ASYNCHRONOUS CH)
[VCID, FLOW ID, BANDWIDTH, e-ACK]
re-direct(ASYNCHRONOUS CH, To=N.3)
[VCID,FLOW ID, e-ACK]
VIDEO DATA (4303)
re-direct(ASYNCHRONOUS CH, To=N.2)
[VCID,FLOW ID, e-ACK]
VIDEO DATA (4302)
re-direct
(ASYNCHRONOUS CH, To=N.1)
[VCID,FLOW ID, e-ACK]
VIDEO DATA (4301)

[VCID,FLOW ID]

FIG.39

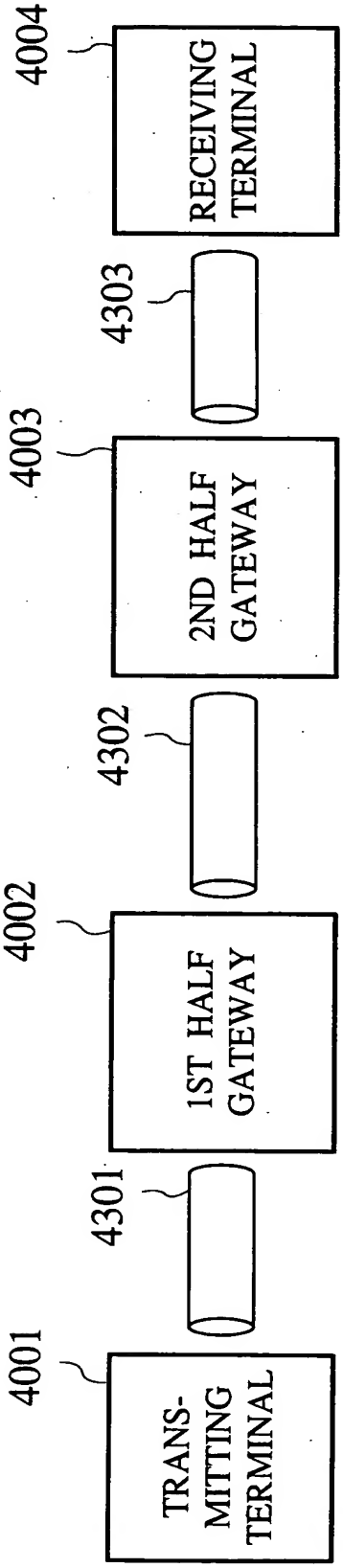


FIG.40

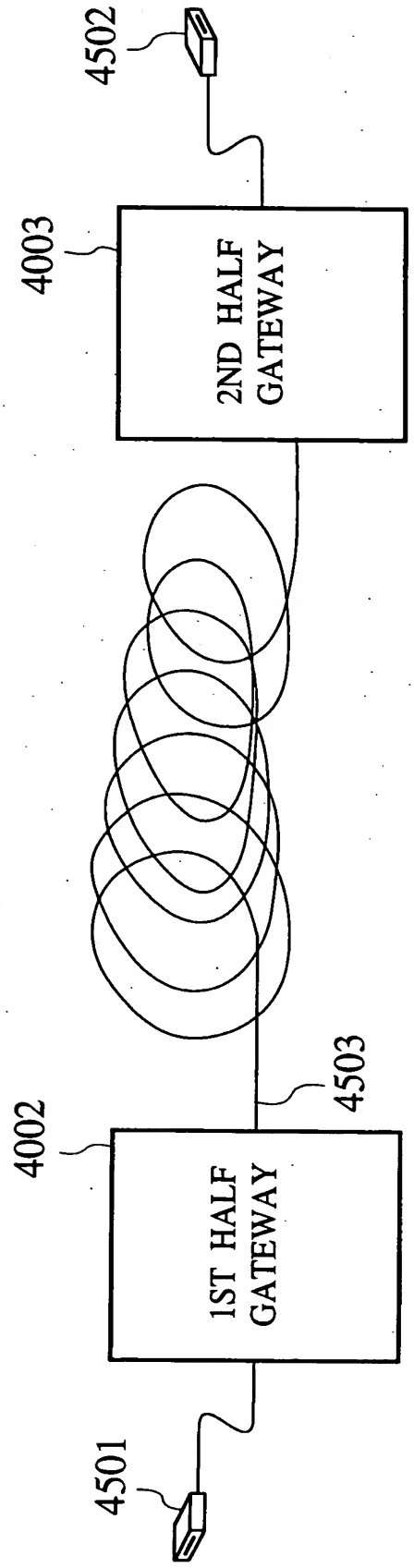


FIG.41

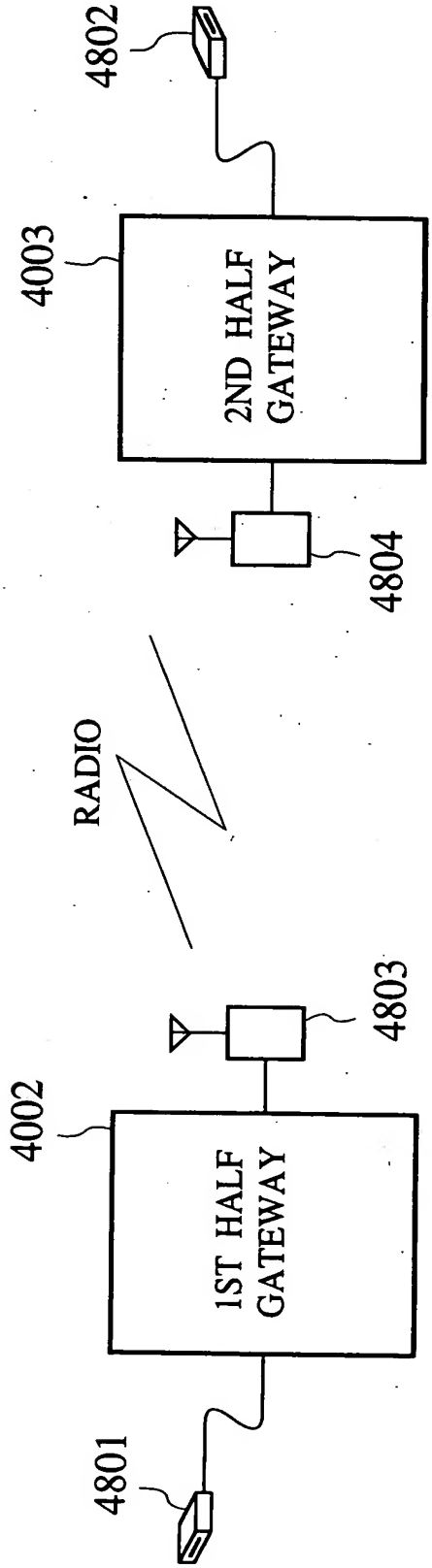

4802
4003
2ND HALF GATEWAY
4804
RADIO
4803
4002
1ST HALF GATEWAY
4801

FIG.42

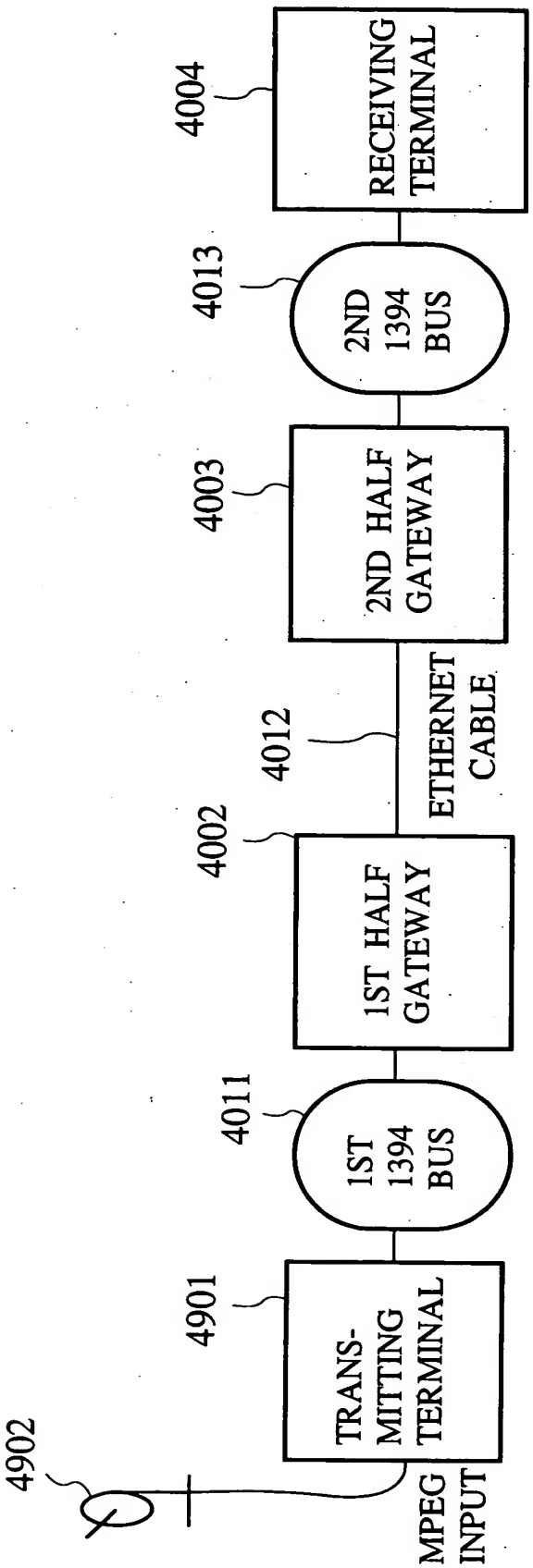

4902
MPEG INPUT
4901
TRANS-MITTING TERMINAL
4011
1ST 1394 BUS
4002
1ST HALF GATEWAY
4012
ETHERNET CABLE
4003
2ND HALF GATEWAY
4013
2ND 1394 BUS
4004
RECEIVING TERMINAL

FIG.43

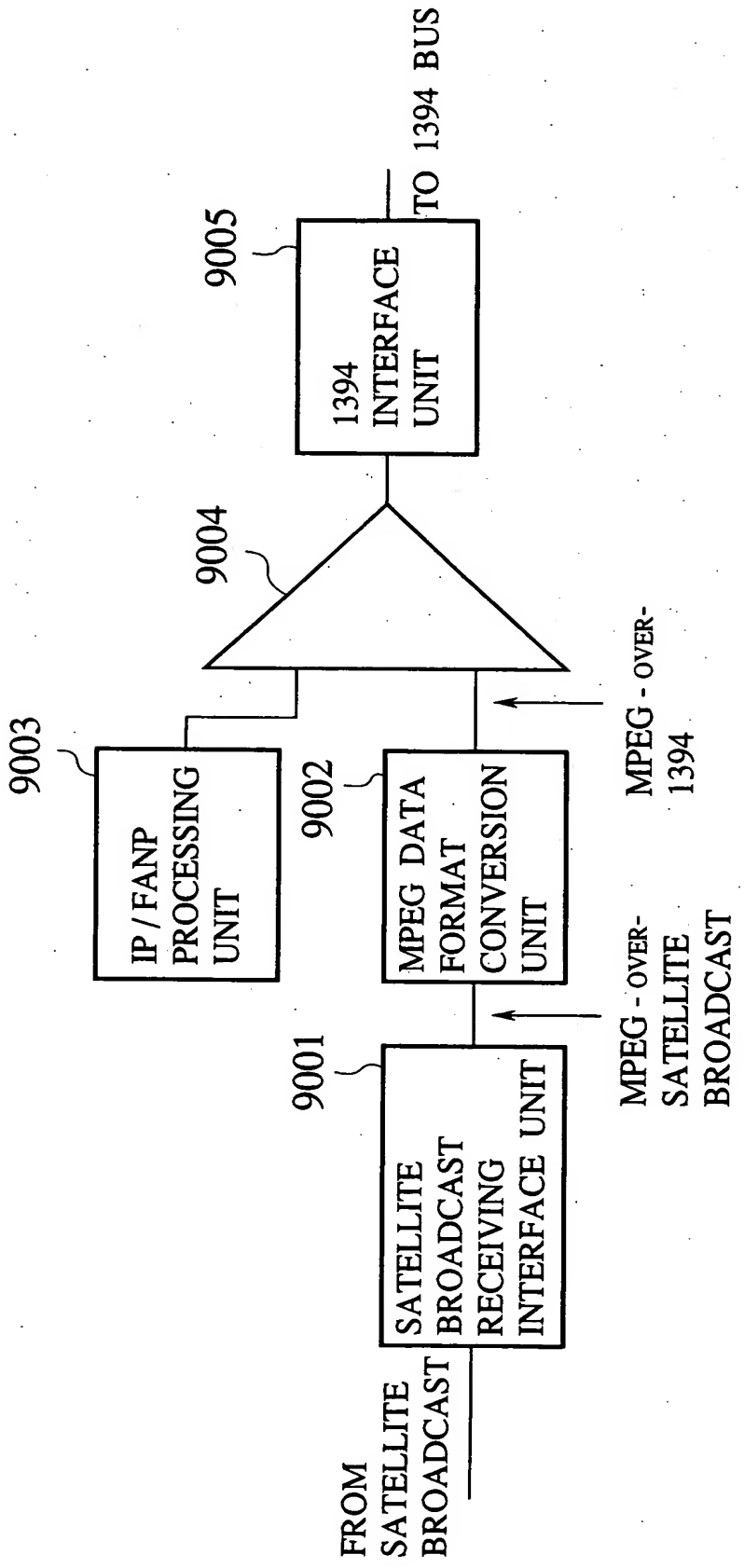

FROM SATELLITE BROADCAST
9001
SATELLITE BROADCAST RECEIVING INTERFACE UNIT
MPEG - OVER-SATELLITE BROADCAST
9002
MPEG DATA FORMAT CONVERSION UNIT
MPEG - OVER-1394
9003
IP / FANP PROCESSING UNIT
9004
9005
1394 INTERFACE UNIT
TO 1394 BUS

FIG.44

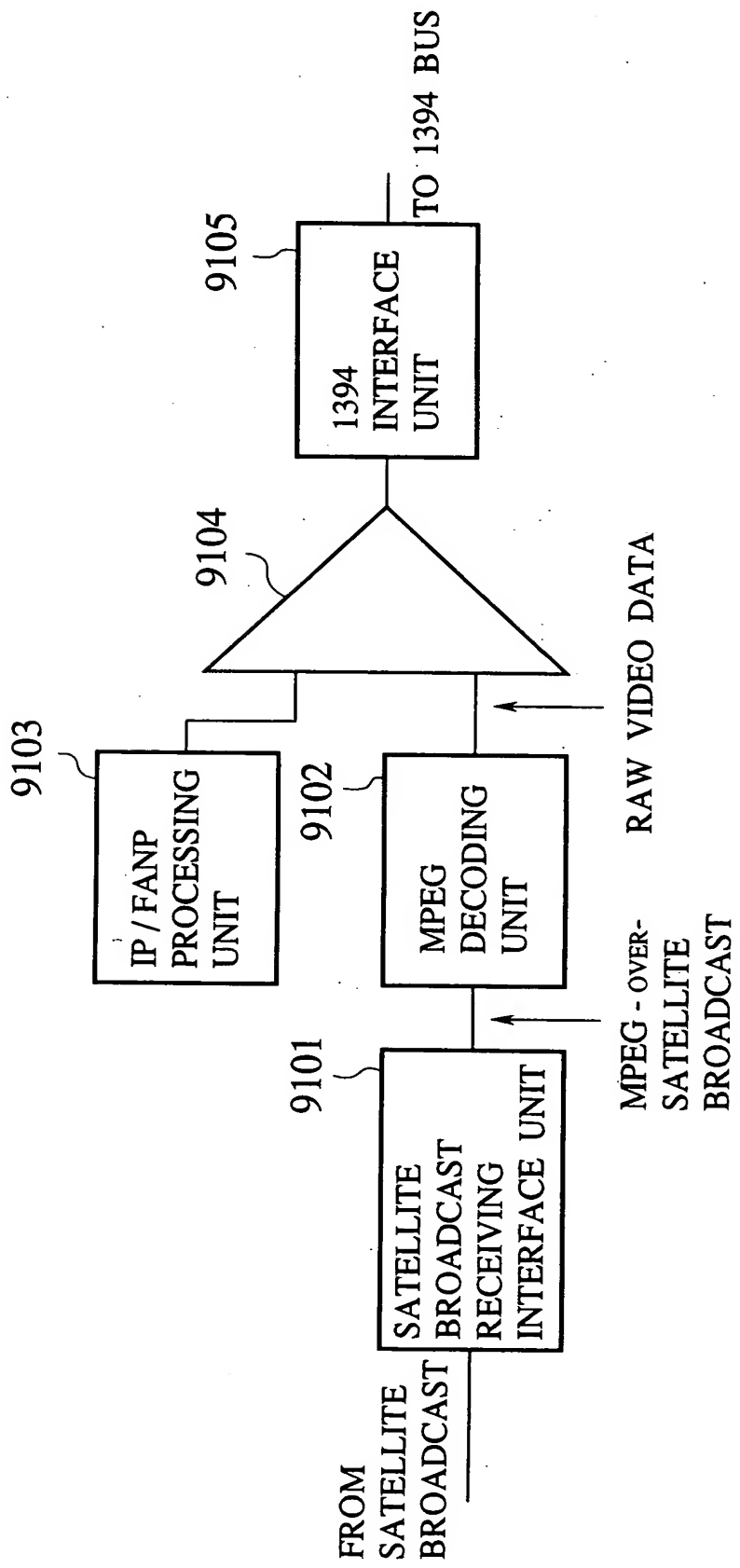

FROM SATELLITE BROADCAST
9101
SATELLITE BROADCAST RECEIVING INTERFACE UNIT
MPEG - OVER-SATELLITE BROADCAST
9102
MPEG DECODING UNIT
RAW VIDEO DATA
9103
IP / FANP PROCESSING UNIT
9104
9105
1394 INTERFACE UNIT
TO 1394 BUS

FIG.45

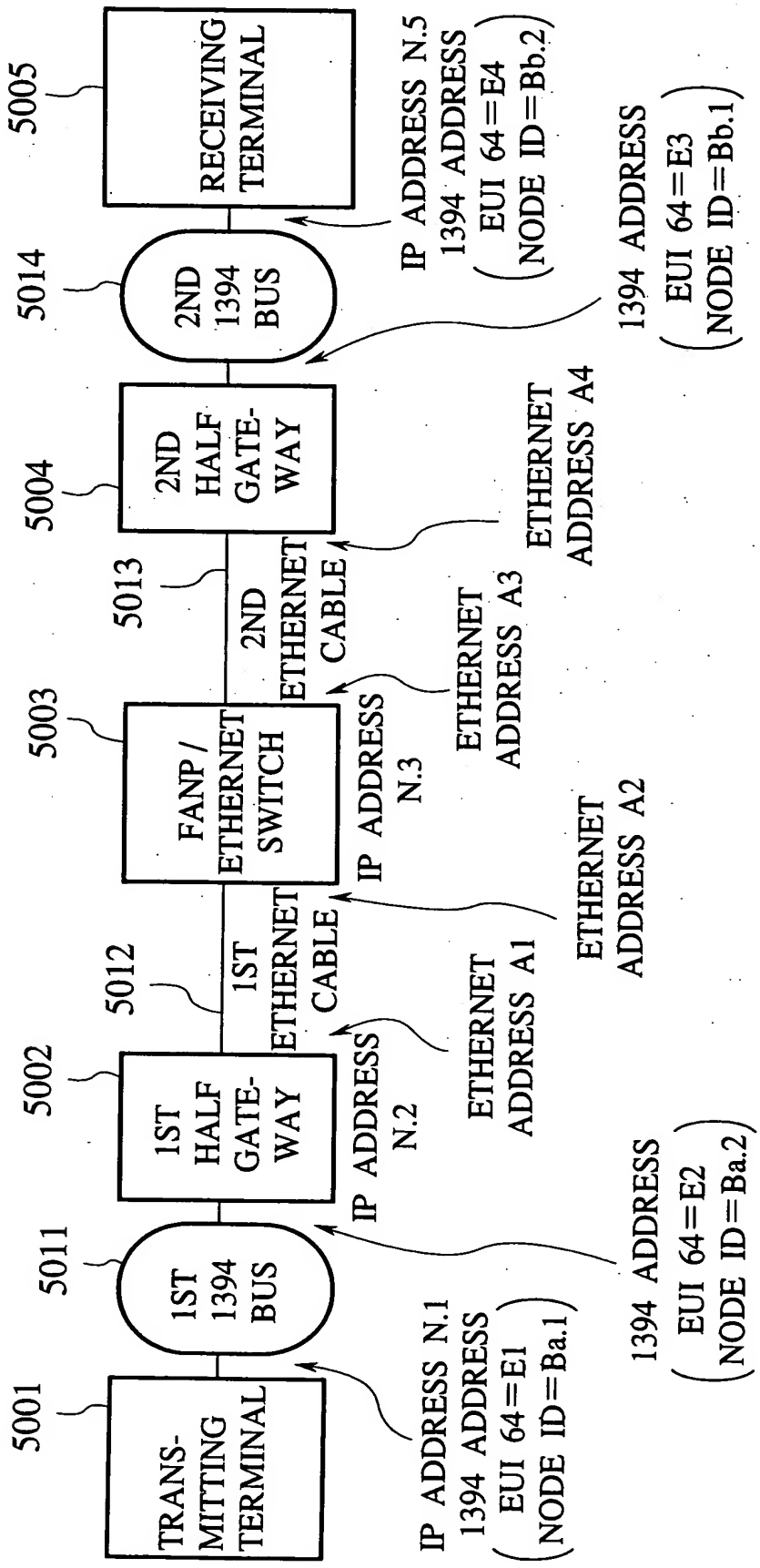

5001
TRANS-MITTING TERMINAL
5011
1ST 1394 BUS
5002
1ST HALF GATE-WAY
5012
1ST ETHERNET CABLE
5003
FANP / ETHERNET SWITCH
5013
2ND ETHERNET CABLE
5004
2ND HALF GATE-WAY
5014
2ND 1394 BUS
5005
RECEIVING TERMINAL
IP ADDRESS N.1
1394 ADDRESS
(EUI 64=E1
NODE ID=Ba.1)
IP ADDRESS N.2
ETHERNET ADDRESS A1
IP ADDRESS N.3
ETHERNET ADDRESS A2
ETHERNET ADDRESS A3
ETHERNET ADDRESS A4
1394 ADDRESS
(EUI 64=E2
NODE ID=Ba.2)
1394 ADDRESS
(EUI 64=E3
NODE ID=Bb.1)
IP ADDRESS N.5
1394 ADDRESS
(EUI 64=E4
NODE ID=Bb.2)

FIG.46

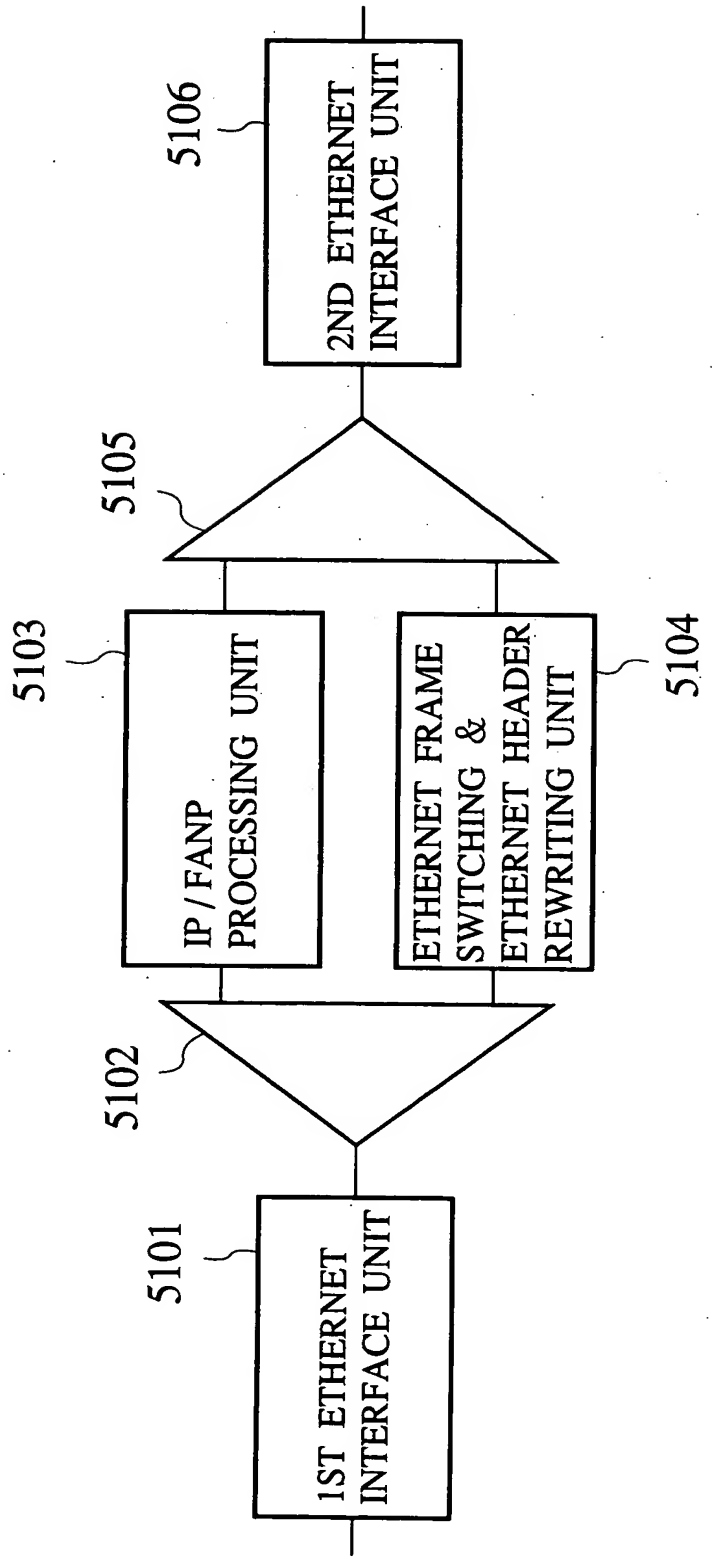

5101
1ST ETHERNET INTERFACE UNIT
5102
5103
IP / FANP PROCESSING UNIT
ETHERNET FRAME SWITCHING & ETHERNET HEADER REWRITING UNIT
5104
5105
5106
2ND ETHERNET INTERFACE UNIT

FIG.47

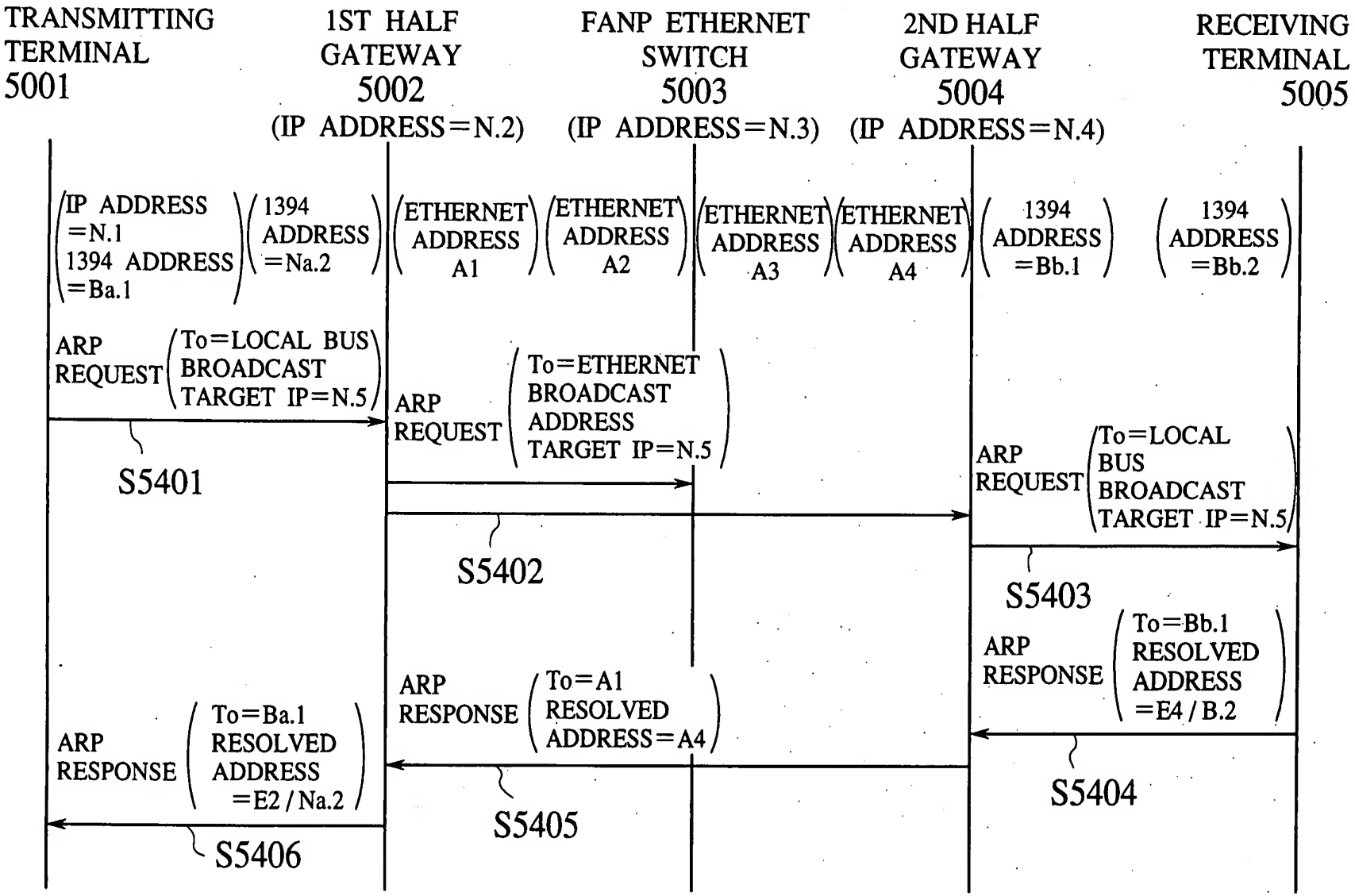


FIG.48

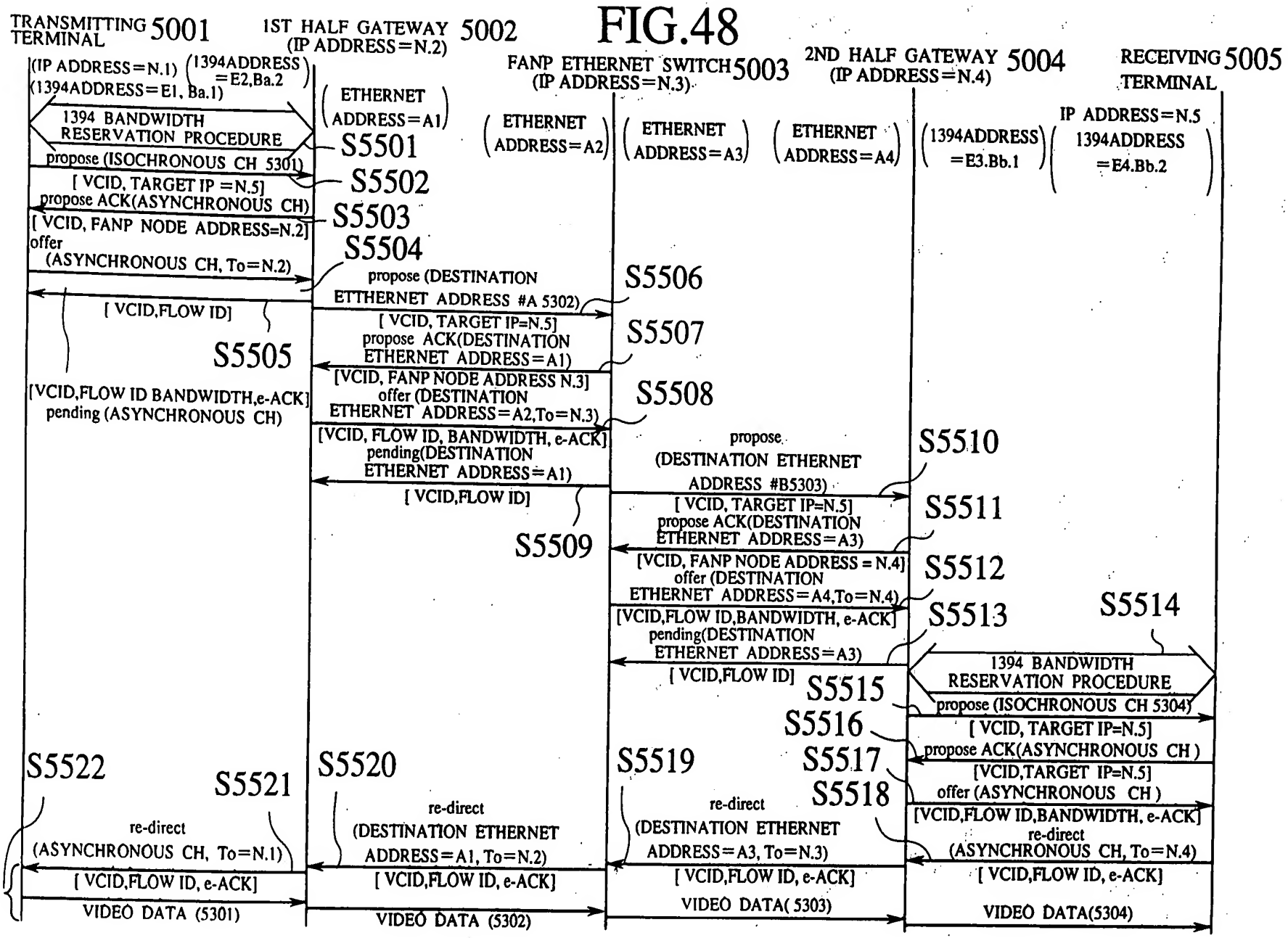


FIG.49

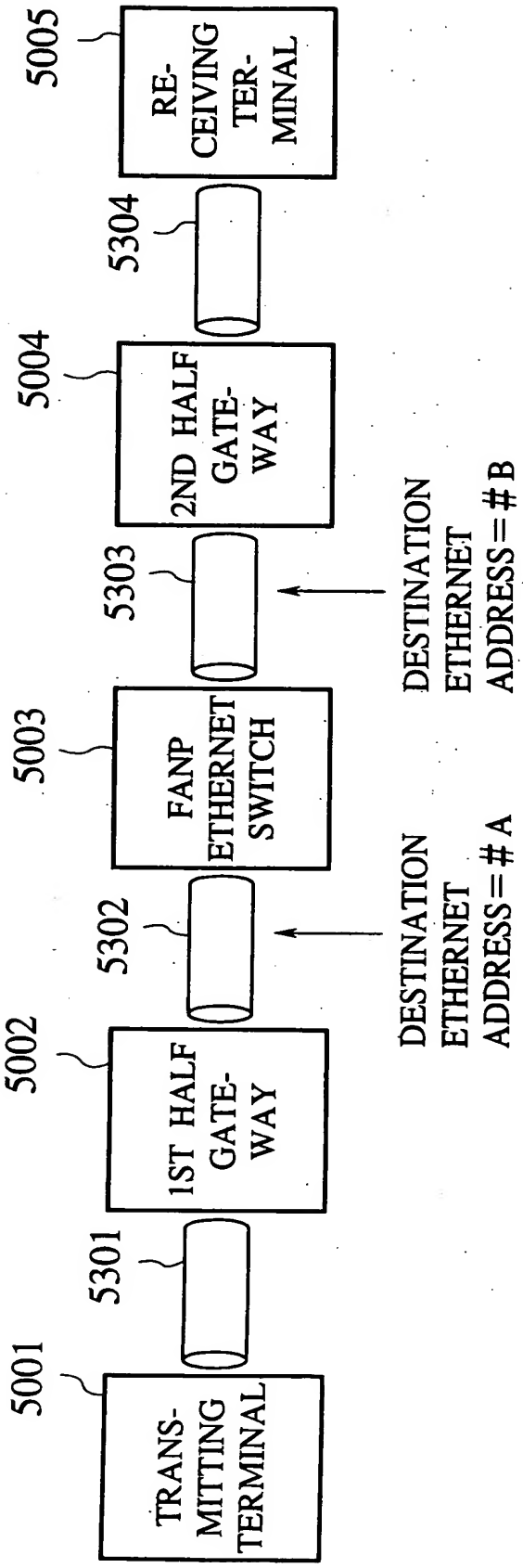

5001
TRANS-MITTING TERMINAL
5301
5002
1ST HALF GATE-WAY
5302
5003
FANP ETHERNET SWITCH
5303
5004
2ND HALF GATE-WAY
5304
5005
RE-CEIVING TER-MINAL
DESTINATION ETHERNET ADDRESS = # A
DESTINATION ETHERNET ADDRESS = # B

FIG.50

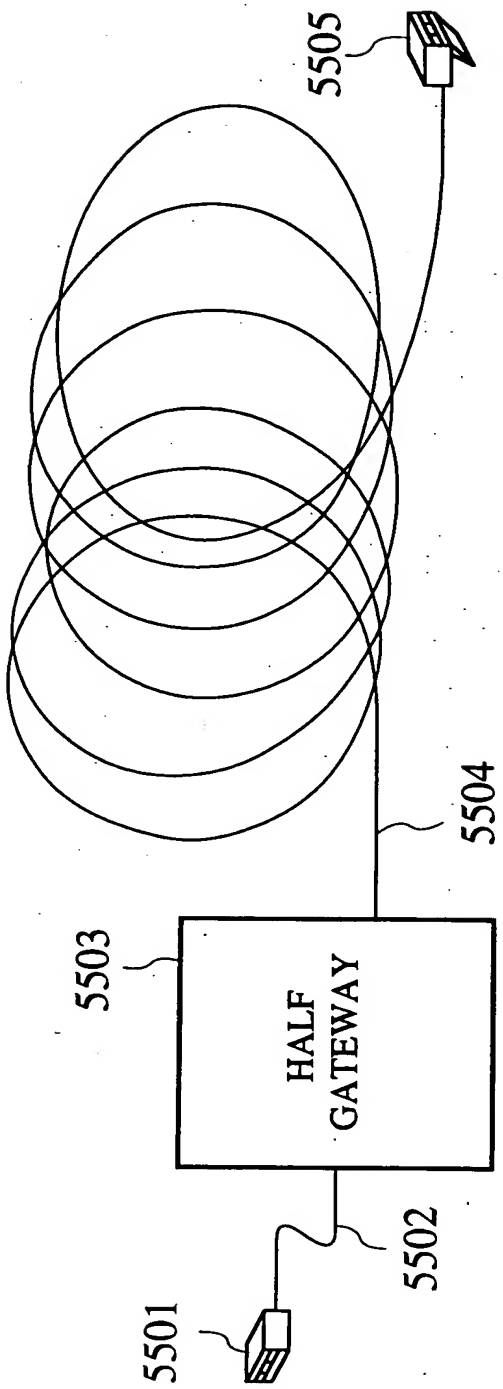


FIG.51

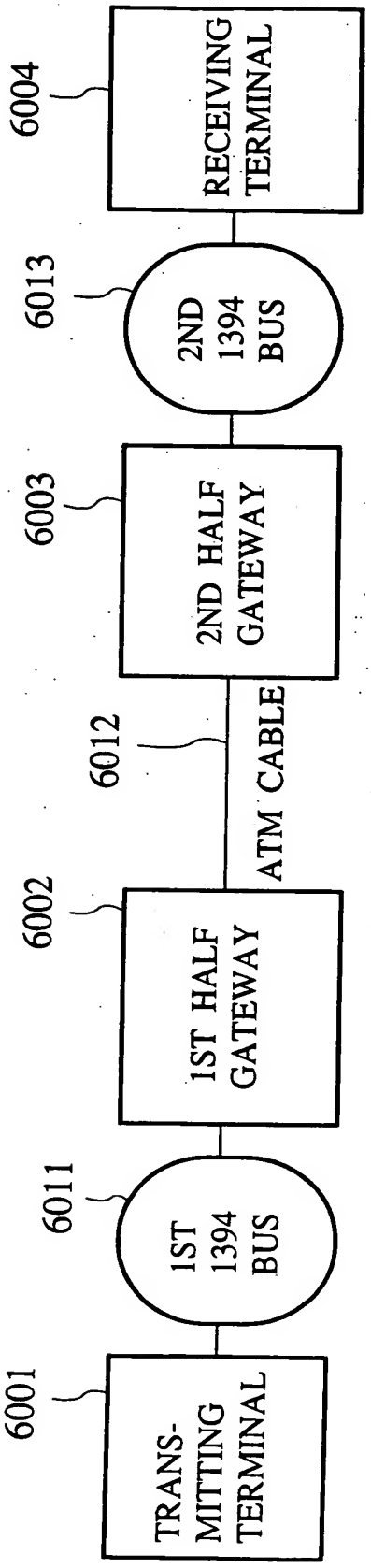

6001
TRANS-MITTING TERMINAL
6011
1ST 1394 BUS
6002
1ST HALF GATEWAY
6012
ATM CABLE
6003
2ND HALF GATEWAY
6013
2ND 1394 BUS
6004
RECEIVING TERMINAL

FIG.52

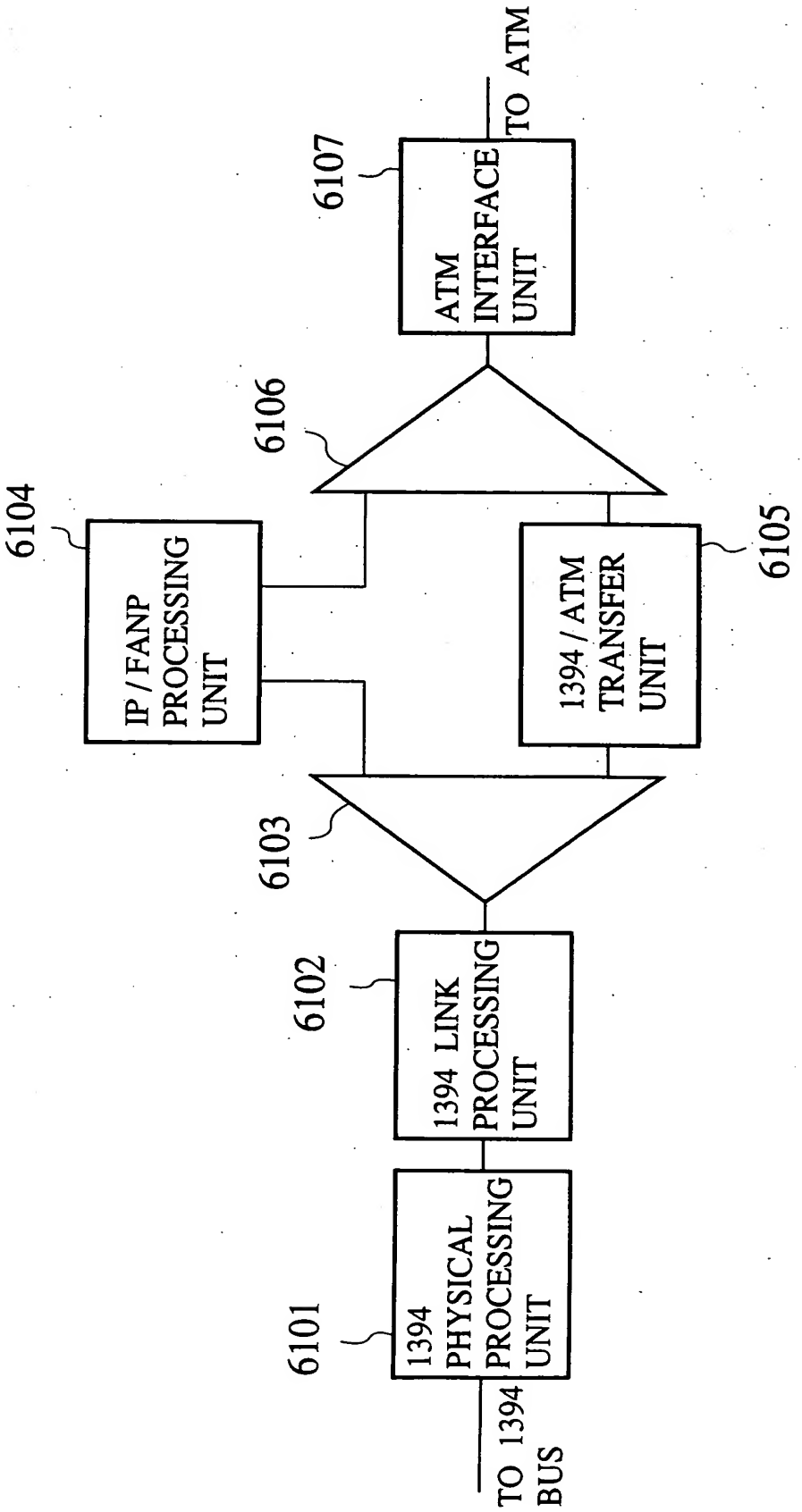

6101
1394 PHYSICAL PROCESSING UNIT
TO 1394 BUS
6102
1394 LINK PROCESSING UNIT
6103
6104
IP / FANP PROCESSING UNIT
6105
1394 / ATM TRANSFER UNIT
6106
6107
ATM INTERFACE UNIT
TO ATM

FIG.53

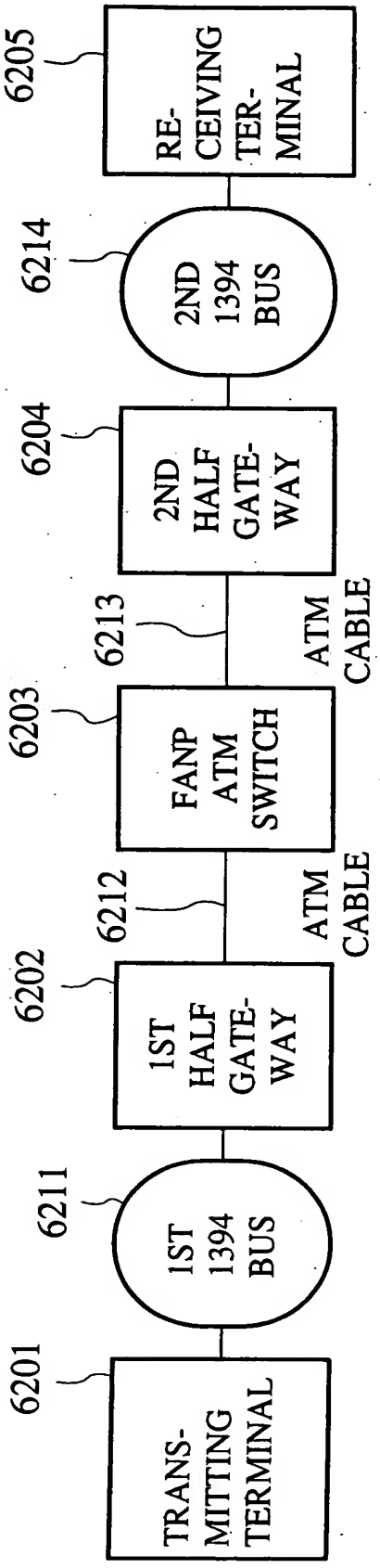

6201
TRANS-MITTING TERMINAL
6211
1ST 1394 BUS
6202
1ST HALF GATE-WAY
6212
ATM CABLE
6203
FANP ATM SWITCH
6213
ATM CABLE
6204
2ND HALF GATE-WAY
6214
2ND 1394 BUS
6205
RE-CEIVING TER-MINAL

FIG.54

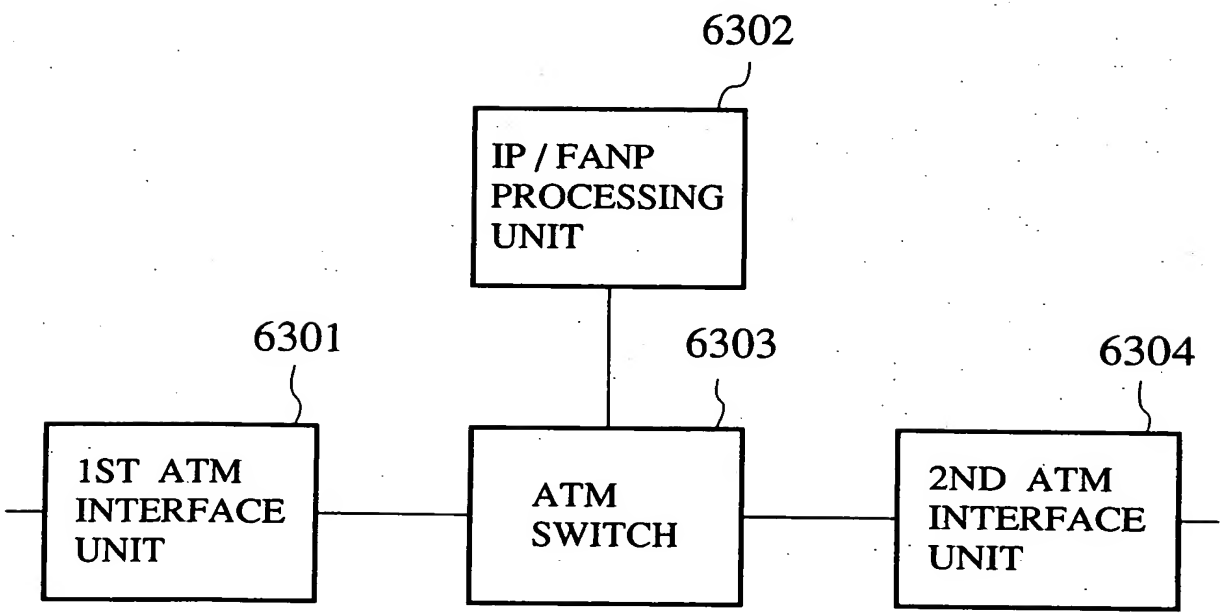

6302
IP / FANP PROCESSING UNIT
6301
6303
6304
1ST ATM INTERFACE UNIT
ATM SWITCH
2ND ATM INTERFACE UNIT

FIG.55

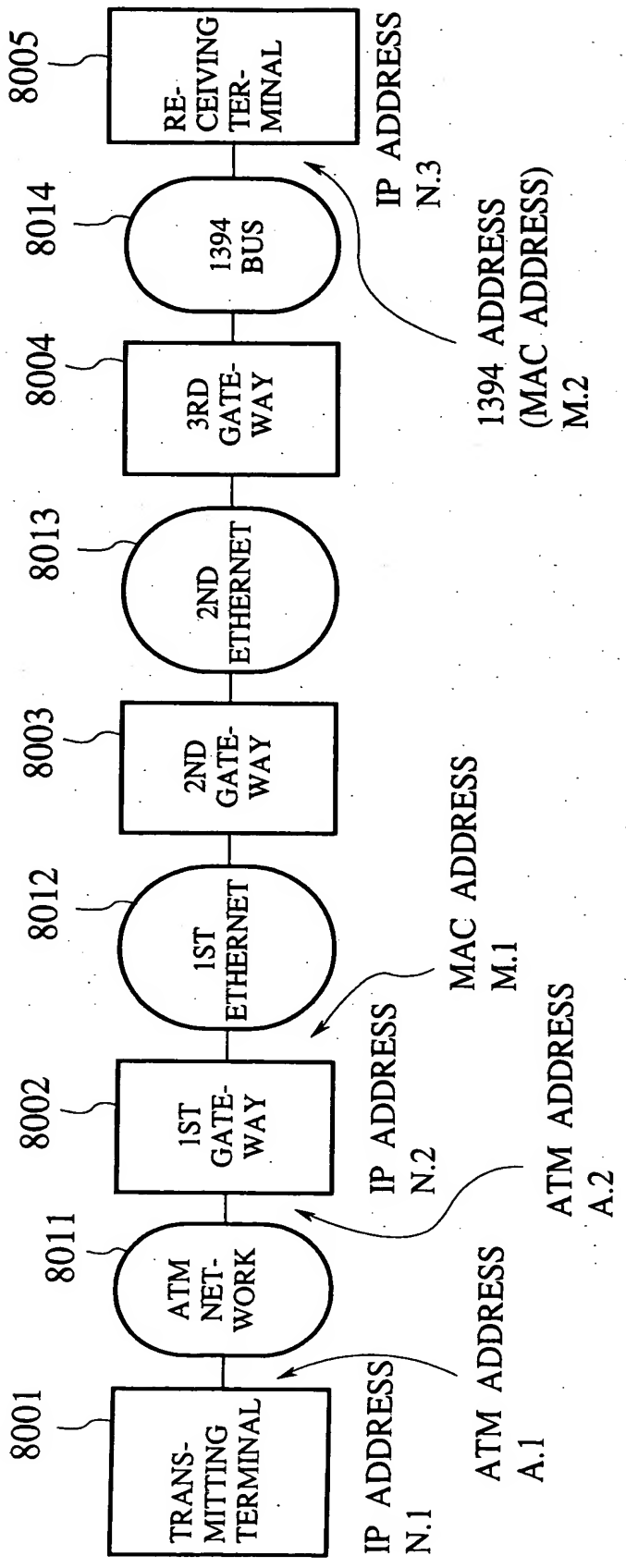
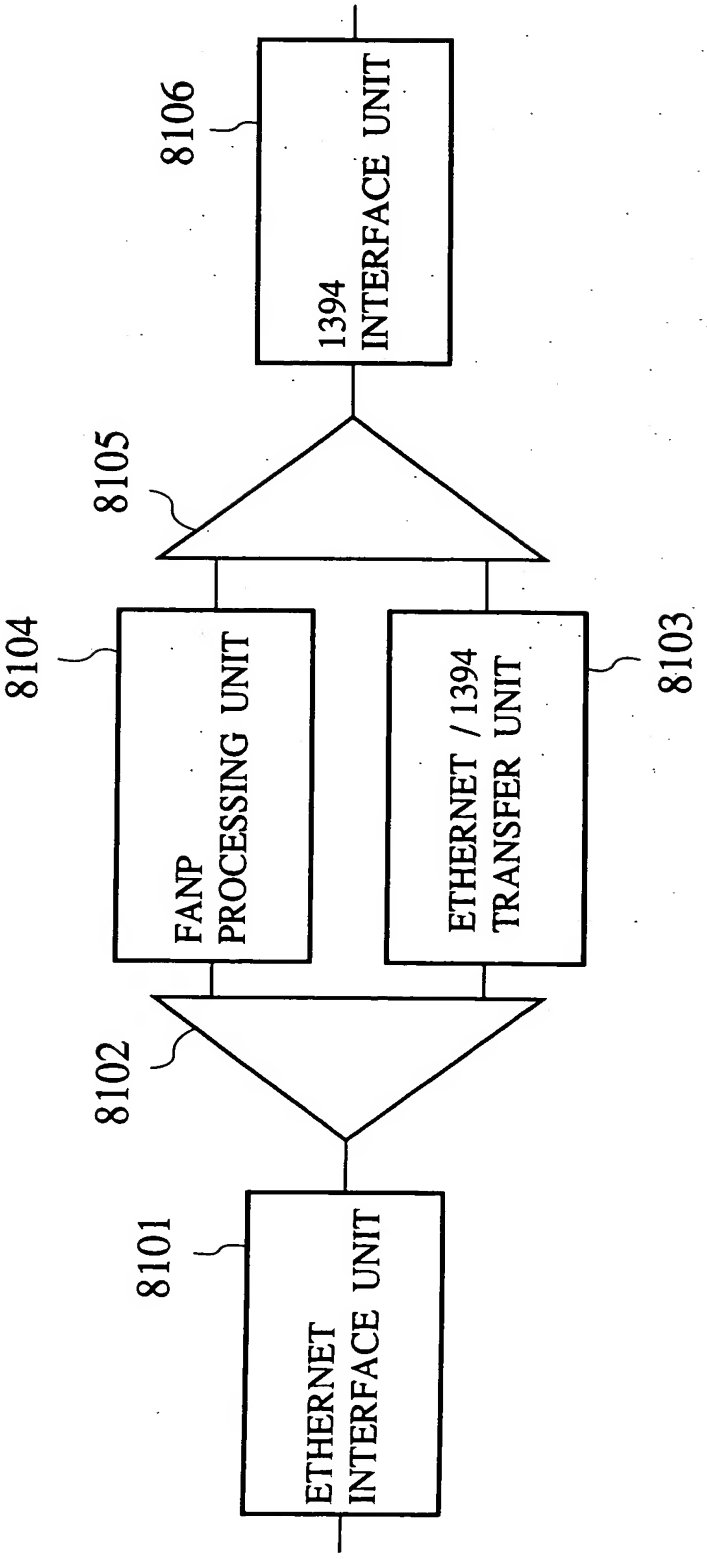

8001
TRANS-MITTING TERMINAL
IP ADDRESS N.1
ATM ADDRESS A.1
8011
ATM NET-WORK
8002
1ST GATE-WAY
IP ADDRESS N.2
ATM ADDRESS A.2
8012
1ST ETHERNET
MAC ADDRESS M.1
8003
2ND GATE-WAY
8013
2ND ETHERNET
8004
3RD GATE-WAY
1394 ADDRESS (MAC ADDRESS) M.2
8014
1394 BUS
IP ADDRESS N.3
8005
RE-CEIVING TER-MINAL

FIG.56


8106
1394 INTERFACE UNIT
8105
8104
FANP PROCESSING UNIT
ETHERNET / 1394 TRANSFER UNIT
8103
8102
8101
ETHERNET INTERFACE UNIT

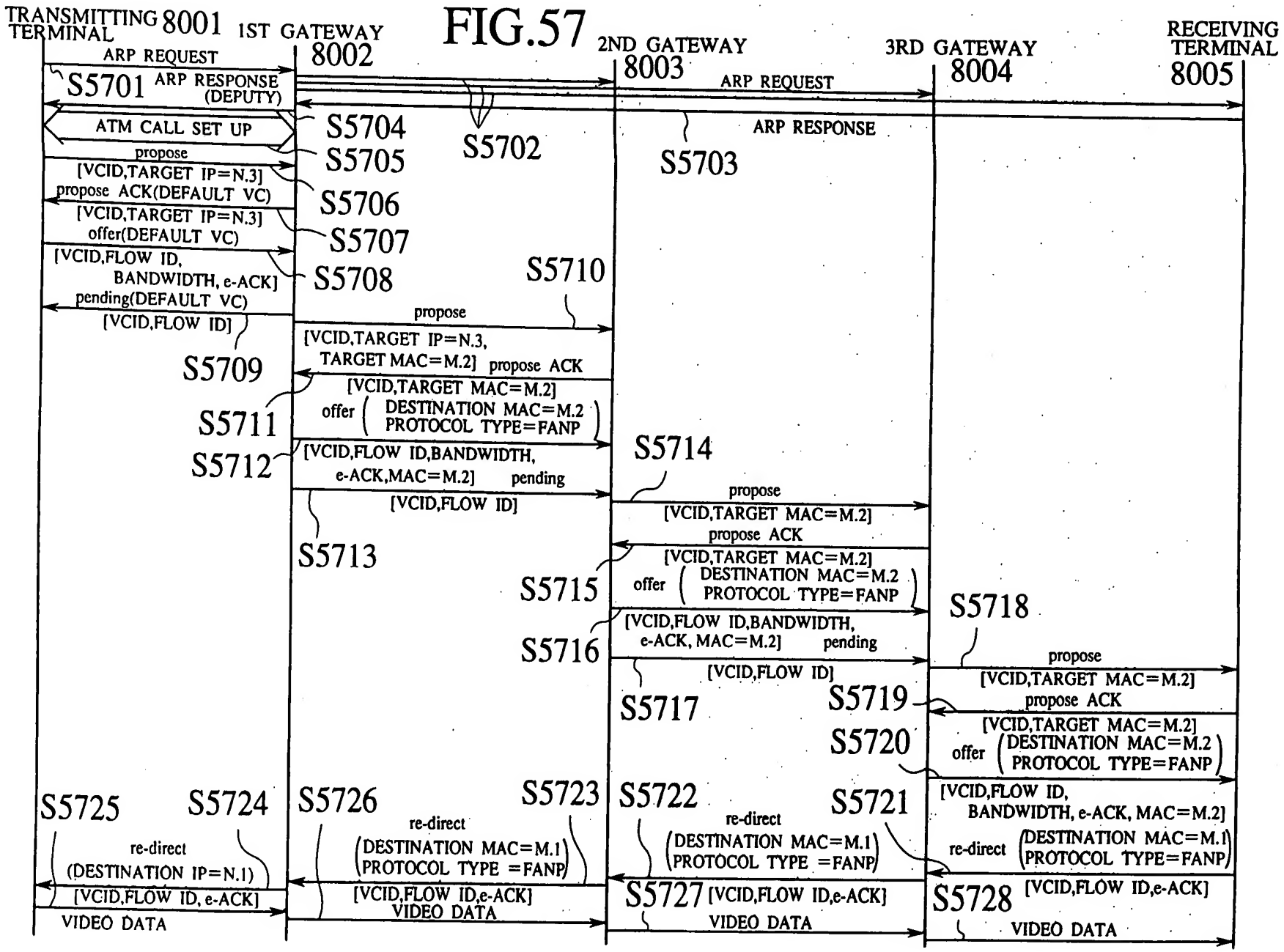


FIG.57

FIG.58

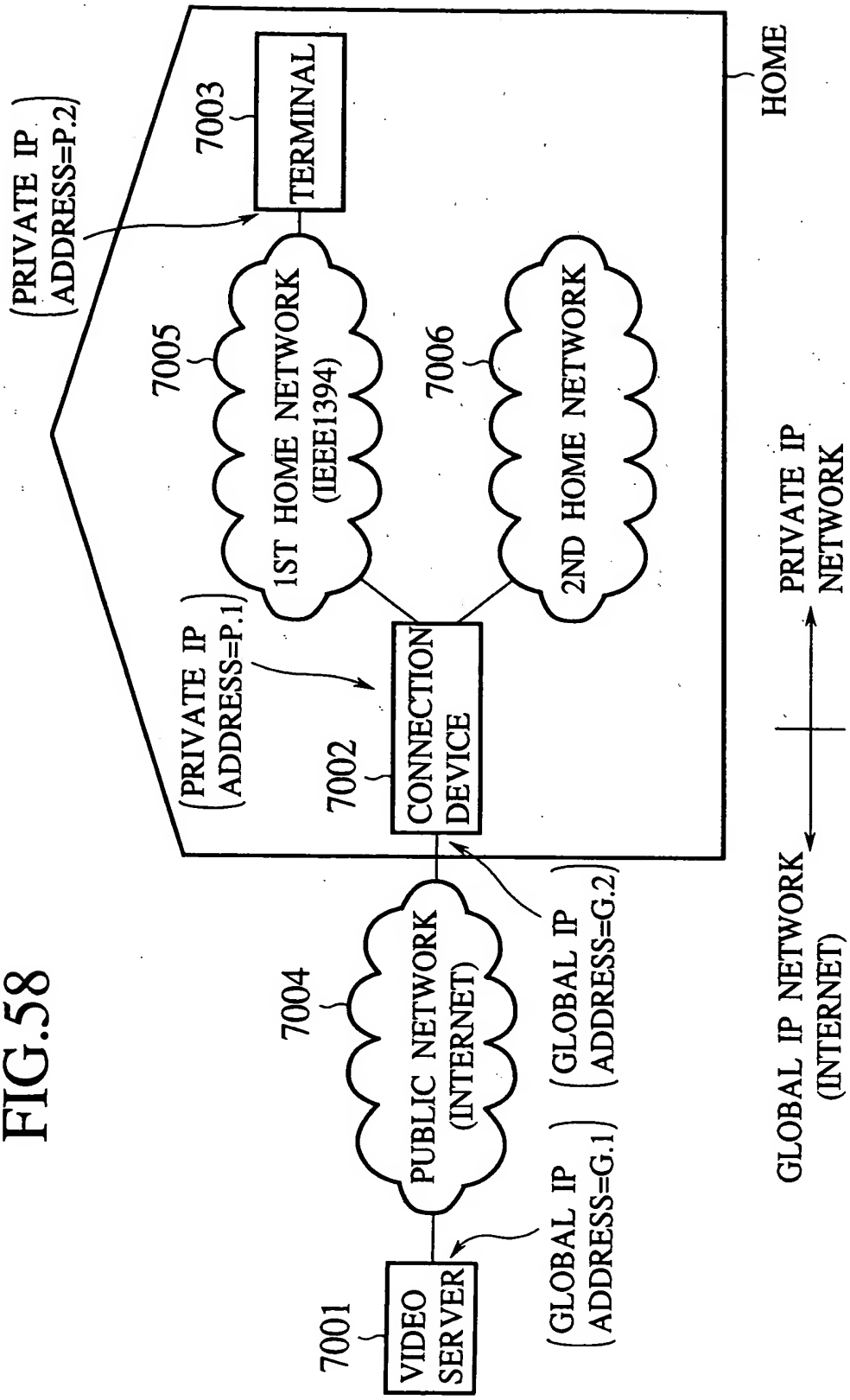

HOME
7003
TERMINAL
(PRIVATE IP ADDRESS=P.2)
7005
1ST HOME NETWORK (IEEE1394)
7006
2ND HOME NETWORK
(PRIVATE IP ADDRESS=P.1)
7002
CONNECTION DEVICE
7004
PUBLIC NETWORK (INTERNET)
(GLOBAL IP ADDRESS=G.2)
PRIVATE IP NETWORK
GLOBAL IP NETWORK (INTERNET)
(GLOBAL IP ADDRESS=G.1)
7001
VIDEO SERVER

FIG.59

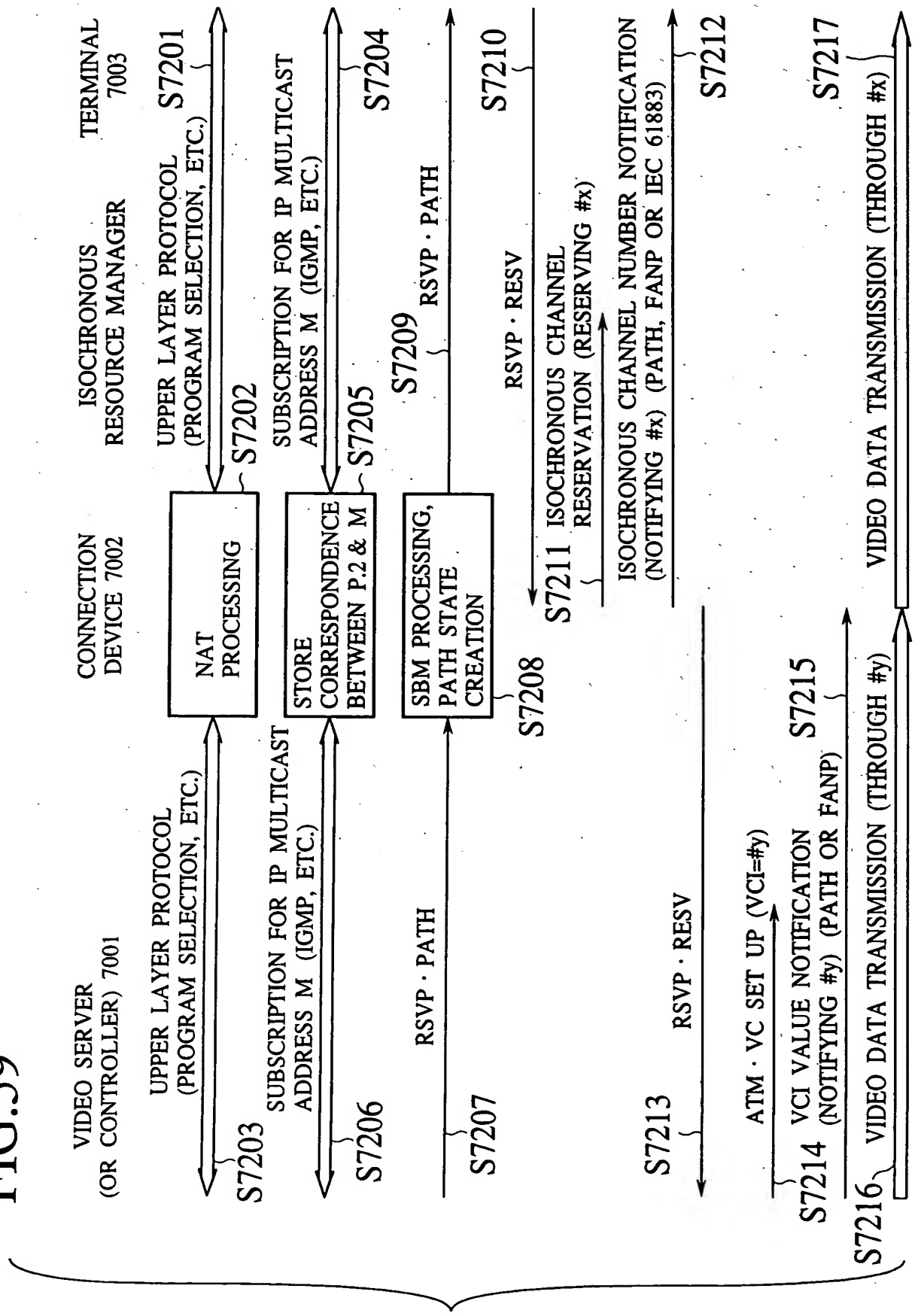

VIDEO SERVER (OR CONTROLLER) 7001
CONNECTION DEVICE 7002
ISOCHRONOUS RESOURCE MANAGER
TERMINAL 7003
UPPER LAYER PROTOCOL (PROGRAM SELECTION, ETC.)
S7201
S7202
S7203
NAT PROCESSING
SUBSCRIPTION FOR IP MULTICAST ADDRESS M (IGMP, ETC.)
S7204
S7205
S7206
STORE CORRESPONDENCE BETWEEN P.2 & M
RSVP · PATH
S7207
S7208
SBM PROCESSING, PATH STATE CREATION
S7209
RSVP · RESV
S7210
S7211
ISOCHRONOUS CHANNEL RESERVATION (RESERVING #x)
ISOCHRONOUS CHANNEL NUMBER NOTIFICATION (NOTIFYING #x) (PATH, FANP OR IEC 61883)
S7212
S7213
RSVP · RESV
ATM · VC SET UP (VCI=#y)
S7214
VCI VALUE NOTIFICATION (NOTIFYING #y) (PATH OR FANP)
S7215
S7216
VIDEO DATA TRANSMISSION (THROUGH #y)
S7217
VIDEO DATA TRANSMISSION (THROUGH #x)

FIG.60

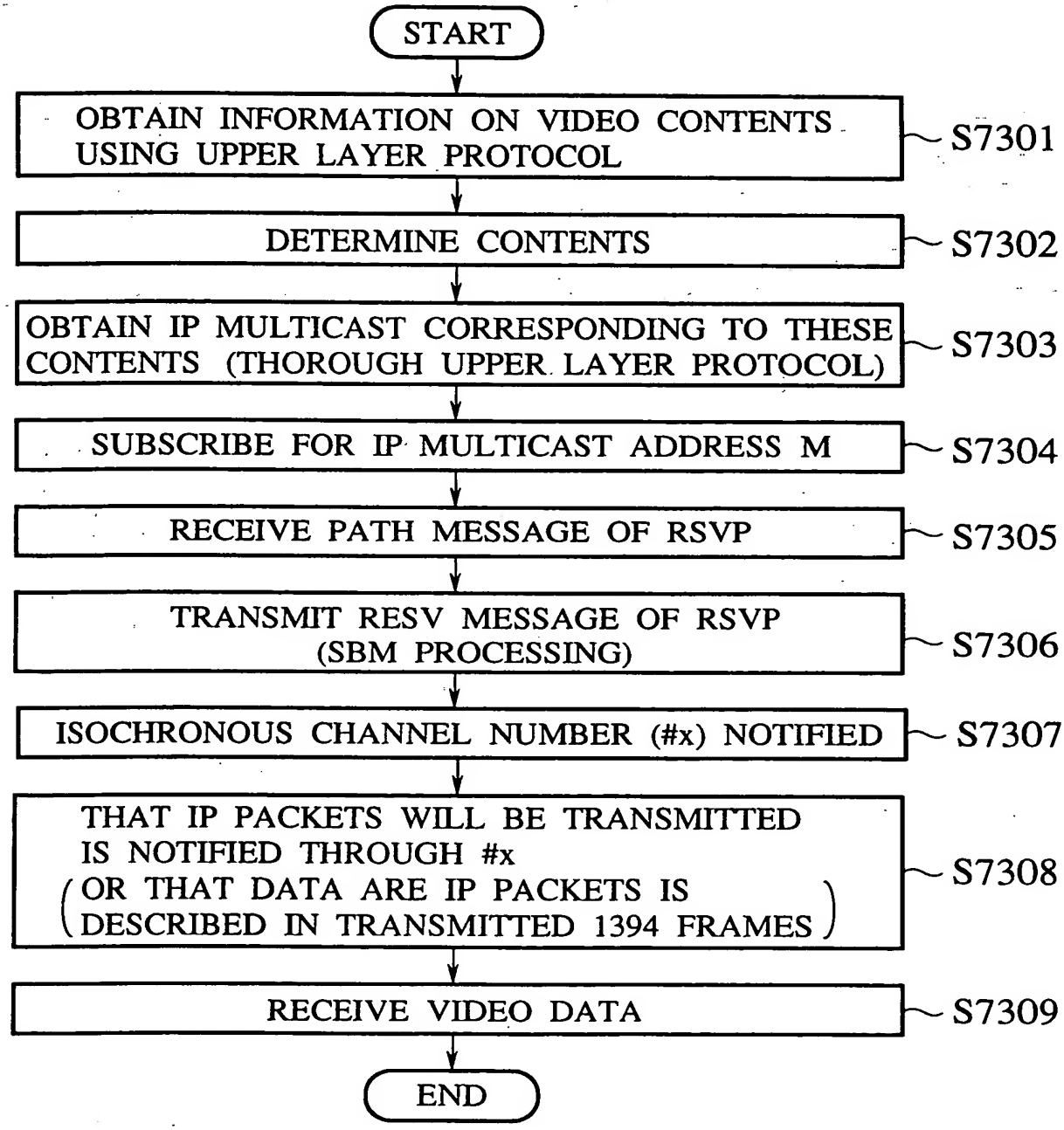

START
OBTAIN INFORMATION ON VIDEO CONTENTS USING UPPER LAYER PROTOCOL
S7301
DETERMINE CONTENTS
S7302
OBTAIN IP MULTICAST CORRESPONDING TO THESE CONTENTS (THOROUGH UPPER LAYER PROTOCOL)
S7303
SUBSCRIBE FOR IP MULTICAST ADDRESS M
S7304
RECEIVE PATH MESSAGE OF RSVP
S7305
TRANSMIT RESV MESSAGE OF RSVP (SBM PROCESSING)
S7306
ISOCHRONOUS CHANNEL NUMBER (#x) NOTIFIED
S7307
THAT IP PACKETS WILL BE TRANSMITTED IS NOTIFIED THROUGH #x
(OR THAT DATA ARE IP PACKETS IS DESCRIBED IN TRANSMITTED 1394 FRAMES)
S7308
RECEIVE VIDEO DATA
S7309
END

FIG.61

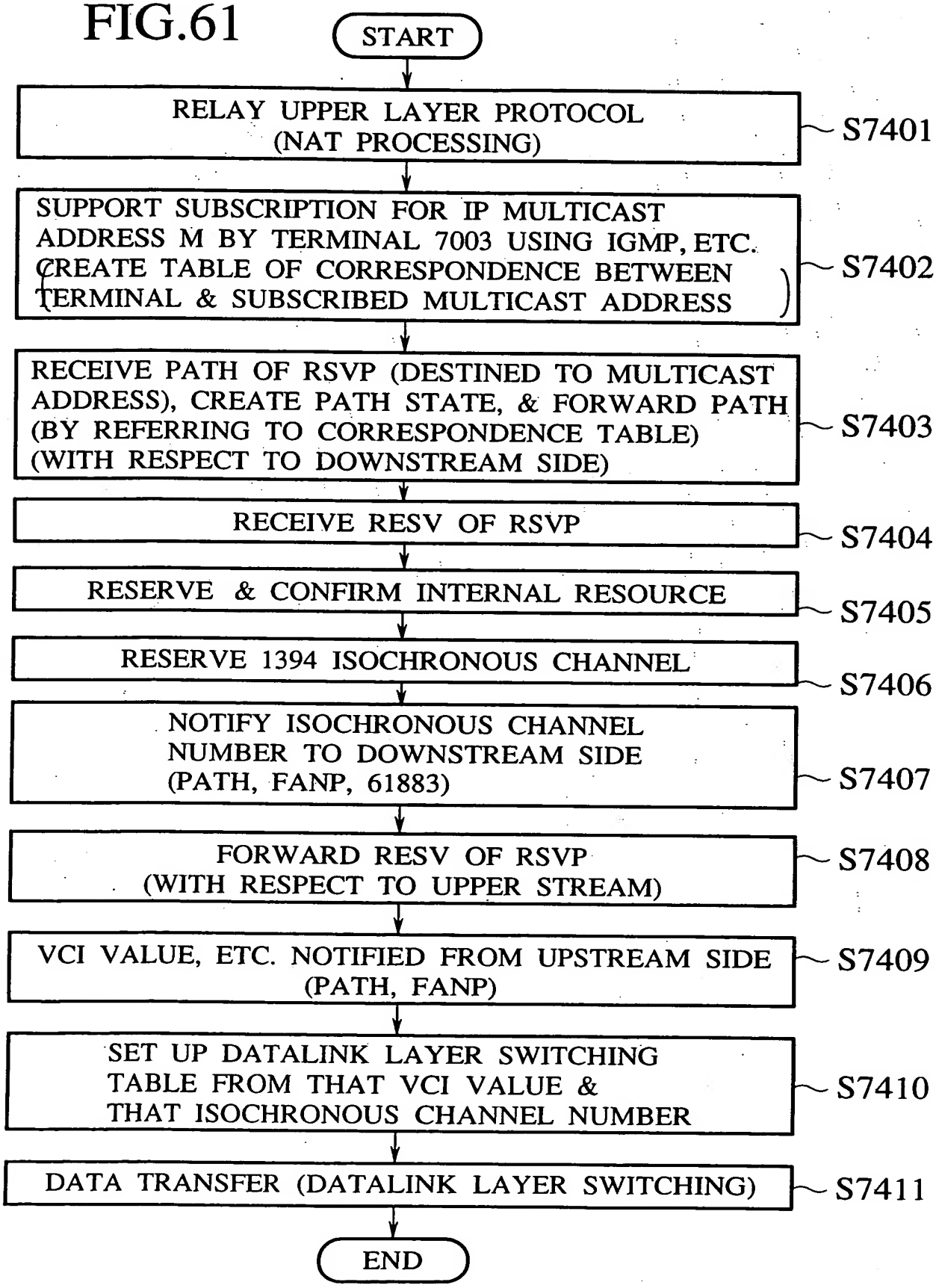

START
RELAY UPPER LAYER PROTOCOL (NAT PROCESSING)
S7401
SUPPORT SUBSCRIPTION FOR IP MULTICAST ADDRESS M BY TERMINAL 7003 USING IGMP, ETC. CREATE TABLE OF CORRESPONDENCE BETWEEN TERMINAL & SUBSCRIBED MULTICAST ADDRESS
S7402
RECEIVE PATH OF RSVP (DESTINED TO MULTICAST ADDRESS), CREATE PATH STATE, & FORWARD PATH (BY REFERRING TO CORRESPONDENCE TABLE) (WITH RESPECT TO DOWNSTREAM SIDE)
S7403
RECEIVE RESV OF RSVP
S7404
RESERVE & CONFIRM INTERNAL RESOURCE
S7405
RESERVE 1394 ISOCHRONOUS CHANNEL
S7406
NOTIFY ISOCHRONOUS CHANNEL NUMBER TO DOWNSTREAM SIDE (PATH, FANP, 61883)
S7407
FORWARD RESV OF RSVP (WITH RESPECT TO UPPER STREAM)
S7408
VCI VALUE, ETC. NOTIFIED FROM UPSTREAM SIDE (PATH, FANP)
S7409
SET UP DATALINK LAYER SWITCHING TABLE FROM THAT VCI VALUE & THAT ISOCHRONOUS CHANNEL NUMBER
S7410
DATA TRANSFER (DATALINK LAYER SWITCHING)
S7411
END

FIG.62

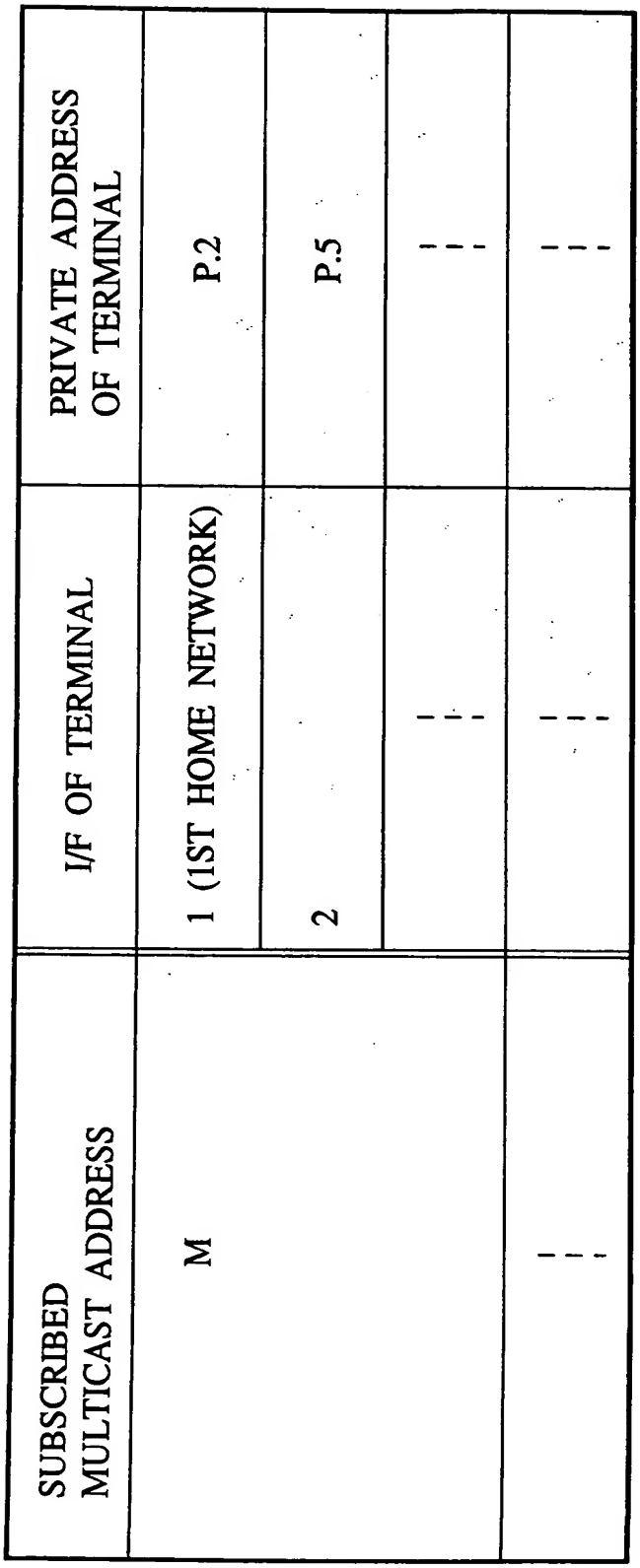

SUBSCRIBED MULTICAST ADDRESS
I/F OF TERMINAL
PRIVATE ADDRESS OF TERMINAL
M
1 (1ST HOME NETWORK)
P.2
2
P.5
- - -
- - -
- - -
- - -
- - -
- - -

FIG.63

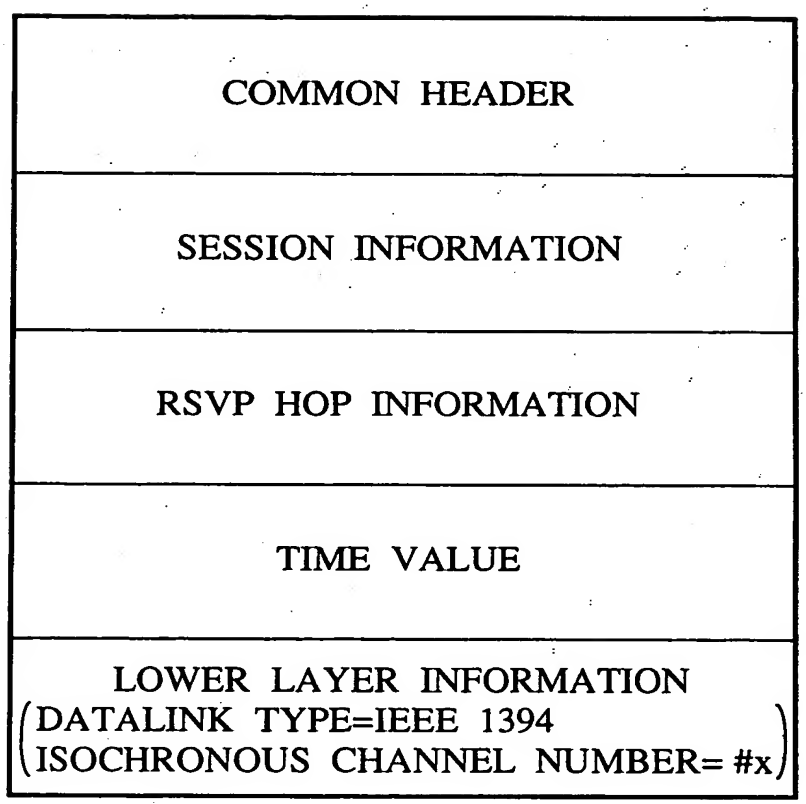

COMMON HEADER
SESSION INFORMATION
RSVP HOP INFORMATION
TIME VALUE
LOWER LAYER INFORMATION
(DATALINK TYPE=IEEE 1394
ISOCHRONOUS CHANNEL NUMBER= #x)

FIG.64

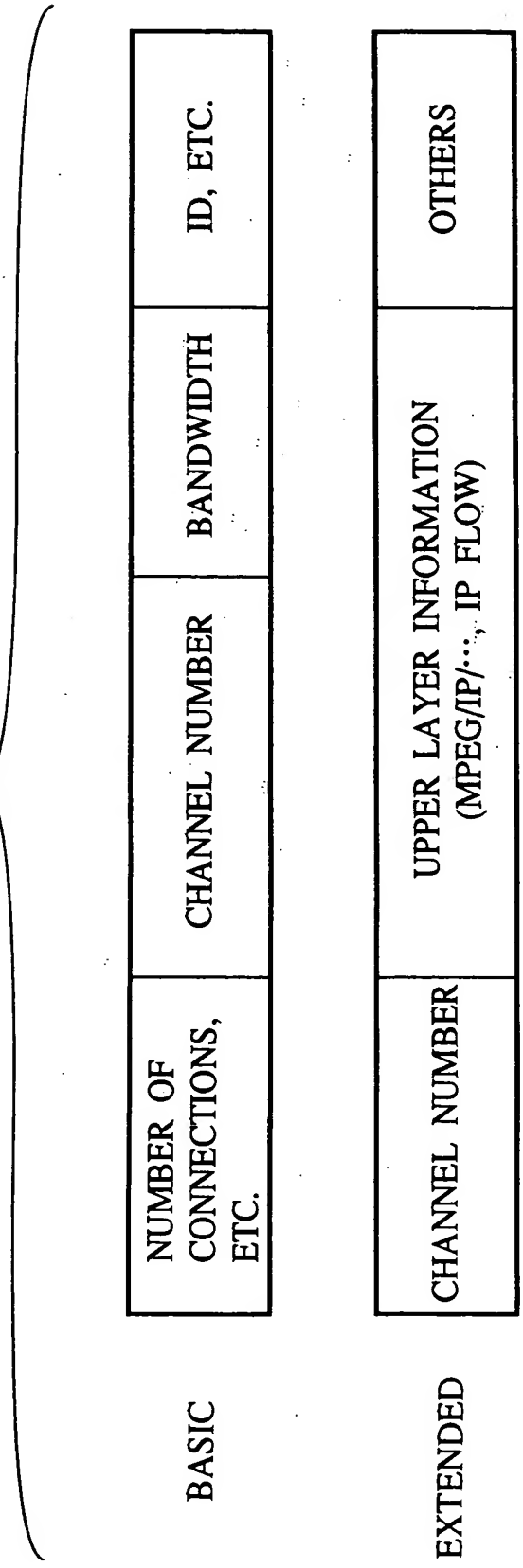

BASIC
NUMBER OF CONNECTIONS, ETC.
CHANNEL NUMBER
BANDWIDTH
ID, ETC.
EXTENDED
CHANNEL NUMBER
UPPER LAYER INFORMATION (MPEG/IP/···, IP FLOW)
OTHERS

FIG.65

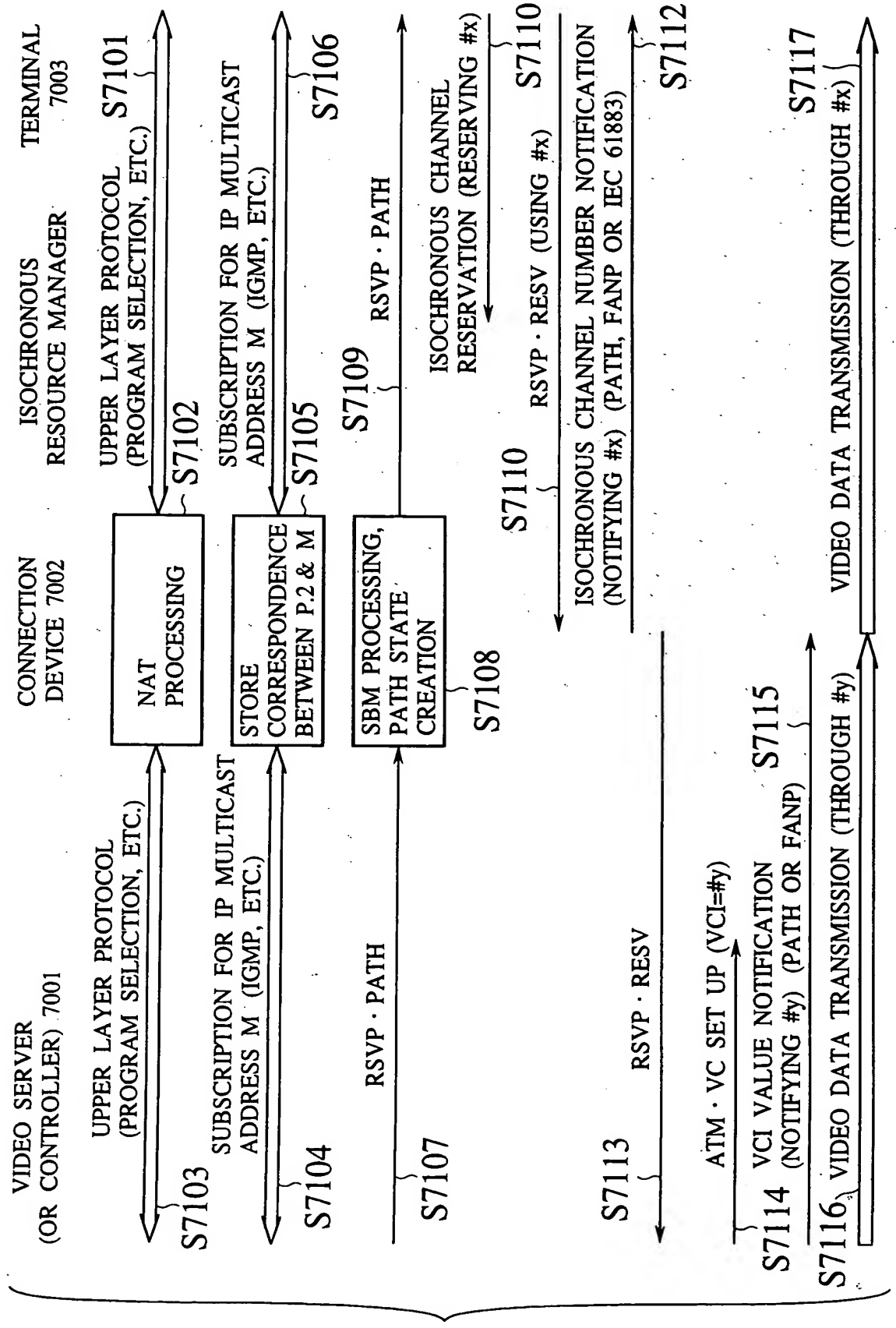

VIDEO SERVER (OR CONTROLLER) 7001
CONNECTION DEVICE 7002
ISOCHRONOUS RESOURCE MANAGER
TERMINAL 7003
UPPER LAYER PROTOCOL (PROGRAM SELECTION, ETC.)
S7101
S7102
NAT PROCESSING
SUBSCRIPTION FOR IP MULTICAST ADDRESS M (IGMP, ETC.)
S7106
S7105
STORE CORRESPONDENCE BETWEEN P.2 & M
S7109
RSVP · PATH
SBM PROCESSING, PATH STATE CREATION
S7108
ISOCHRONOUS CHANNEL RESERVATION (RESERVING #x)
S7110
RSVP · RESV (USING #x)
S7110
ISOCHRONOUS CHANNEL NUMBER NOTIFICATION (NOTIFYING #x) (PATH, FANP OR IEC 61883)
S7112
UPPER LAYER PROTOCOL (PROGRAM SELECTION, ETC.)
S7103
SUBSCRIPTION FOR IP MULTICAST ADDRESS M (IGMP, ETC.)
S7104
RSVP · PATH
S7107
RSVP · RESV
S7113
ATM · VC SET UP (VCI=#y)
VCI VALUE NOTIFICATION (NOTIFYING #y) (PATH OR FANP)
S7115
S7114
VIDEO DATA TRANSMISSION (THROUGH #y)
S7116
VIDEO DATA TRANSMISSION (THROUGH #x)
S7117

FIG.66

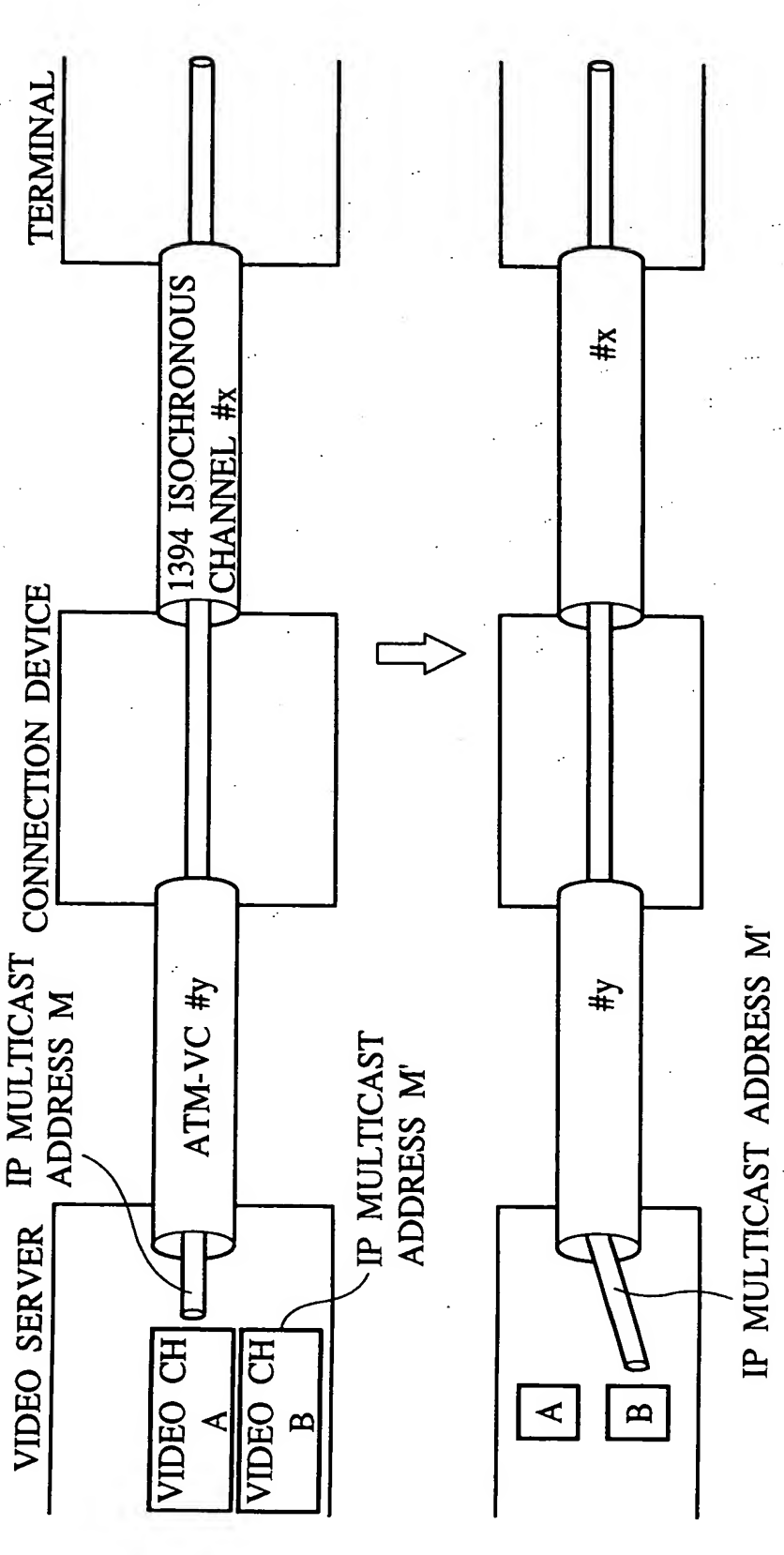

VIDEO SERVER
IP MULTICAST ADDRESS M
ATM-VC #y
CONNECTION DEVICE
1394 ISOCHRONOUS CHANNEL #x
TERMINAL
VIDEO CH A
VIDEO CH B
IP MULTICAST ADDRESS M'
#y
#x
A
B
IP MULTICAST ADDRESS M'

FIG.67

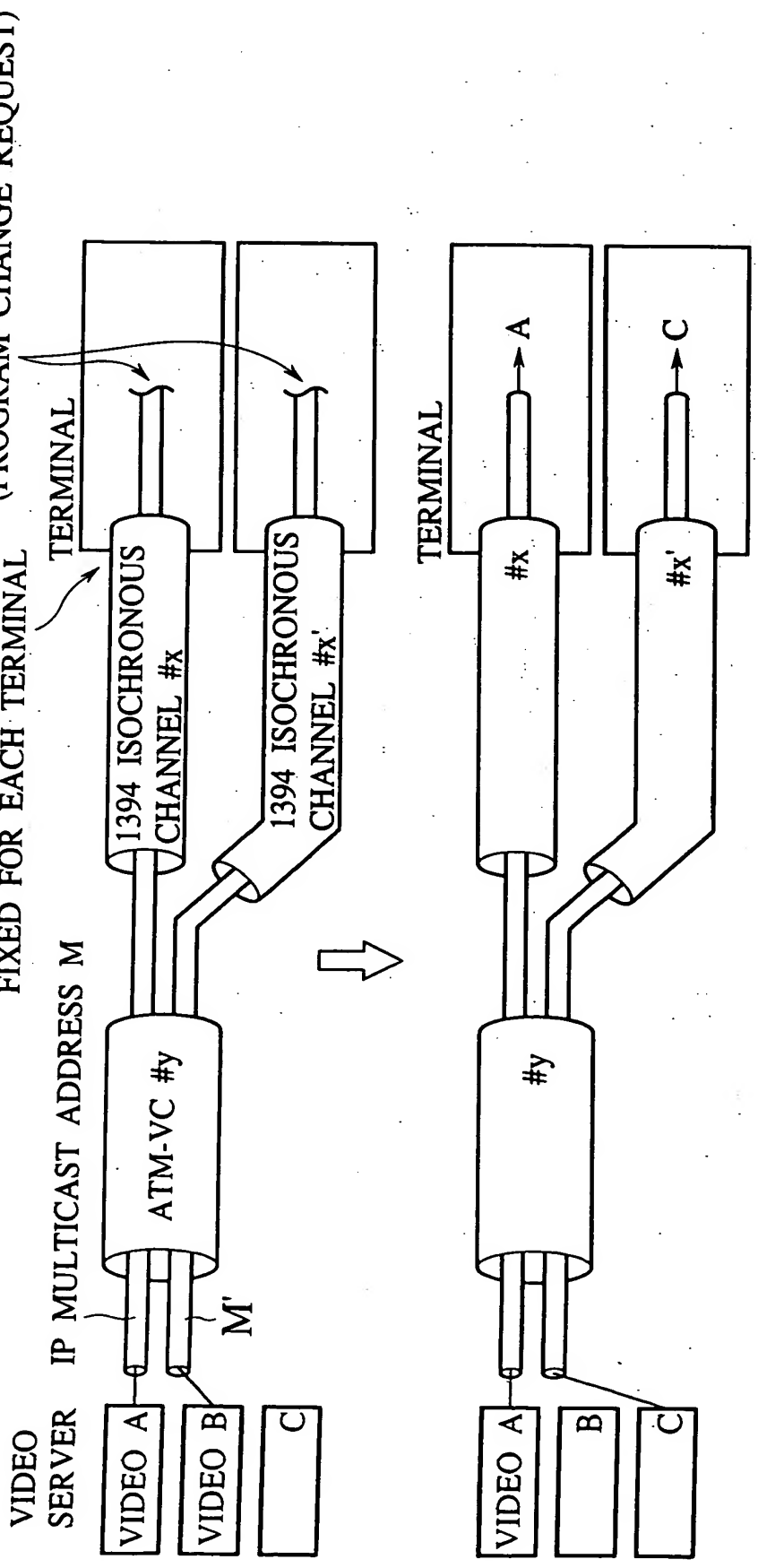

VIDEO SERVER
IP MULTICAST ADDRESS M
MULTICAST ADDRESS FIXED FOR EACH TERMINAL
UPPER LAYER PROTOCOL (PROGRAM CHANGE REQUEST)
TERMINAL
ATM-VC #y
1394 ISOCHRONOUS CHANNEL #x
1394 ISOCHRONOUS CHANNEL #x'
M'
VIDEO A
VIDEO B
C
TERMINAL
#y
#x
#x'
A
C
VIDEO A
B
C

FIG.68

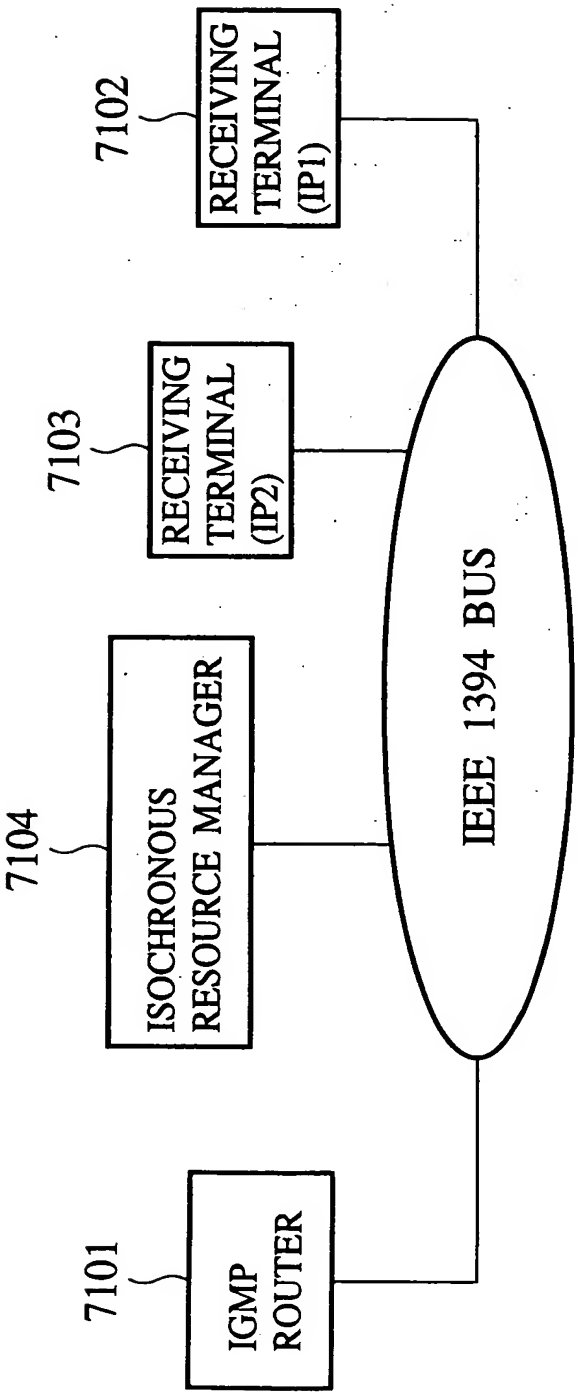

7101
IGMP ROUTER
7102
RECEIVING TERMINAL (IP1)
7103
RECEIVING TERMINAL (IP2)
7104
ISOCHRONOUS RESOURCE MANAGER
IEEE 1394 BUS

FIG.69

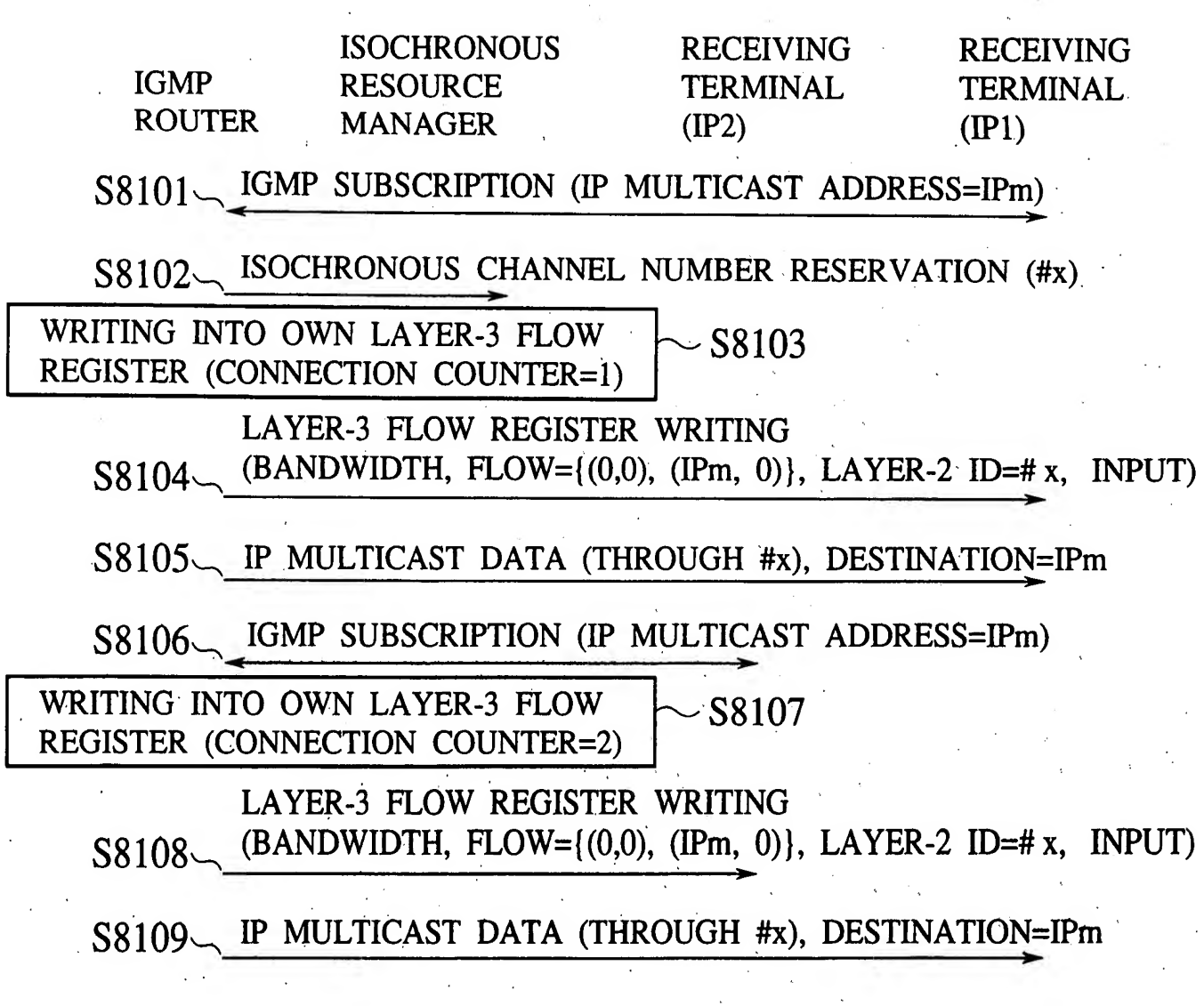


FIG.70

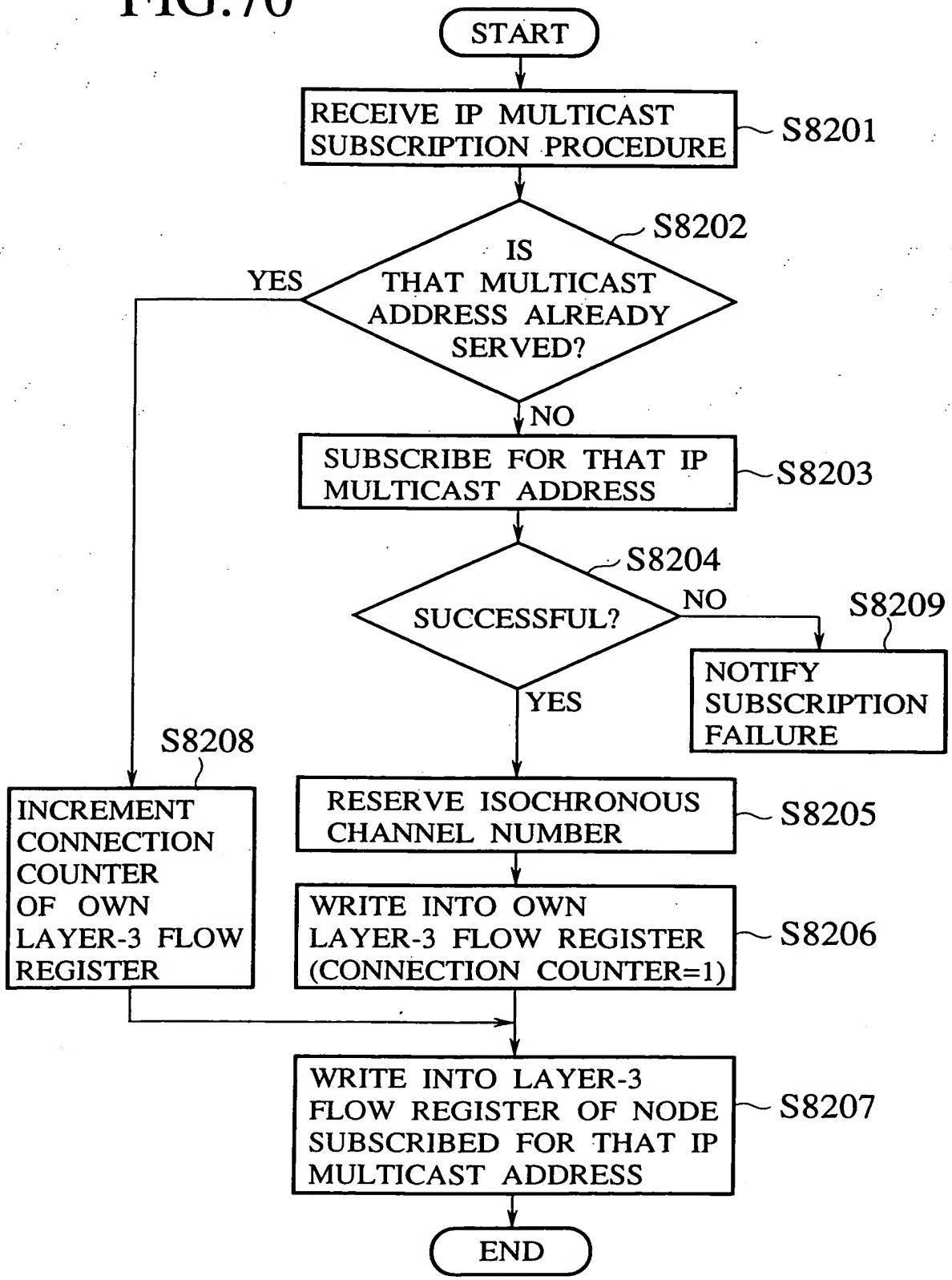

START
RECEIVE IP MULTICAST SUBSCRIPTION PROCEDURE
S8201
S8202
IS THAT MULTICAST ADDRESS ALREADY SERVED?
YES
NO
SUBSCRIBE FOR THAT IP MULTICAST ADDRESS
S8203
S8204
SUCCESSFUL?
NO
S8209
NOTIFY SUBSCRIPTION FAILURE
YES
S8208
INCREMENT CONNECTION COUNTER OF OWN LAYER-3 FLOW REGISTER
RESERVE ISOCHRONOUS CHANNEL NUMBER
S8205
WRITE INTO OWN LAYER-3 FLOW REGISTER (CONNECTION COUNTER=1)
S8206
WRITE INTO LAYER-3 FLOW REGISTER OF NODE SUBSCRIBED FOR THAT IP MULTICAST ADDRESS
S8207
END

FIG.71

LAYER-3 FLOW REGISTER

BANDWIDTH
FLOW ID SOURCE IP ADDRESS (0) SOURCE PORT NUMBER (0) DESTINATION IP ADDRESS (IPm) DESTINATION PORT NUMBER (0)
LAYER-2 ID LAYER-2 TYPE (IEEE 1394) ID TYPE (ISOCHRONOUS CHANNEL NUMBER) ID (#x)
DIRECTION (OUTPUT)
CONNECTION COUNTER

FIG.72

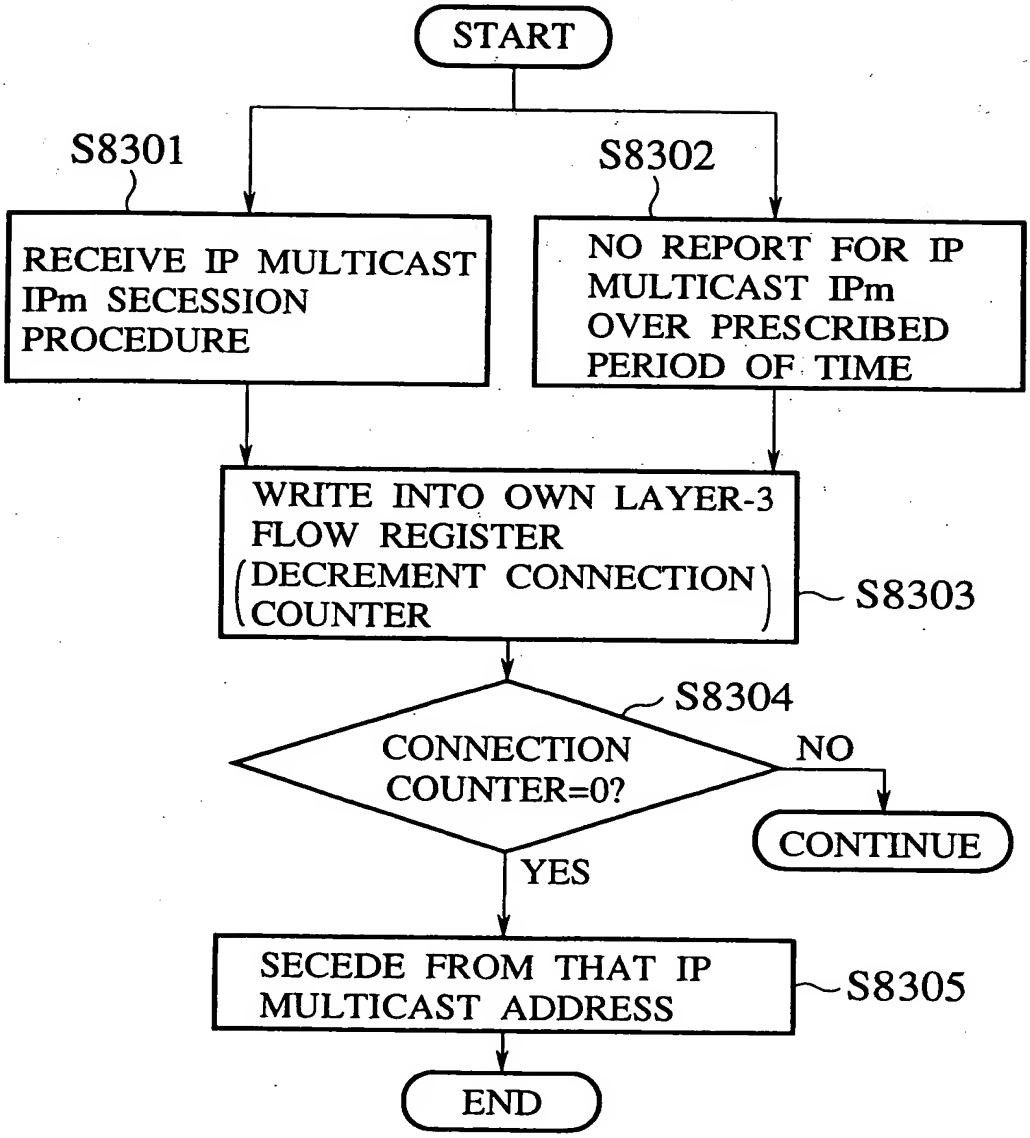

START
S8301
S8302
RECEIVE IP MULTICAST IPm SECESSION PROCEDURE
NO REPORT FOR IP MULTICAST IPm OVER PRESCRIBED PERIOD OF TIME
WRITE INTO OWN LAYER-3 FLOW REGISTER (DECREMENT CONNECTION COUNTER
S8303
S8304
CONNECTION COUNTER=0?
NO
CONTINUE
YES
SECEDE FROM THAT IP MULTICAST ADDRESS
S8305
END

FIG.73

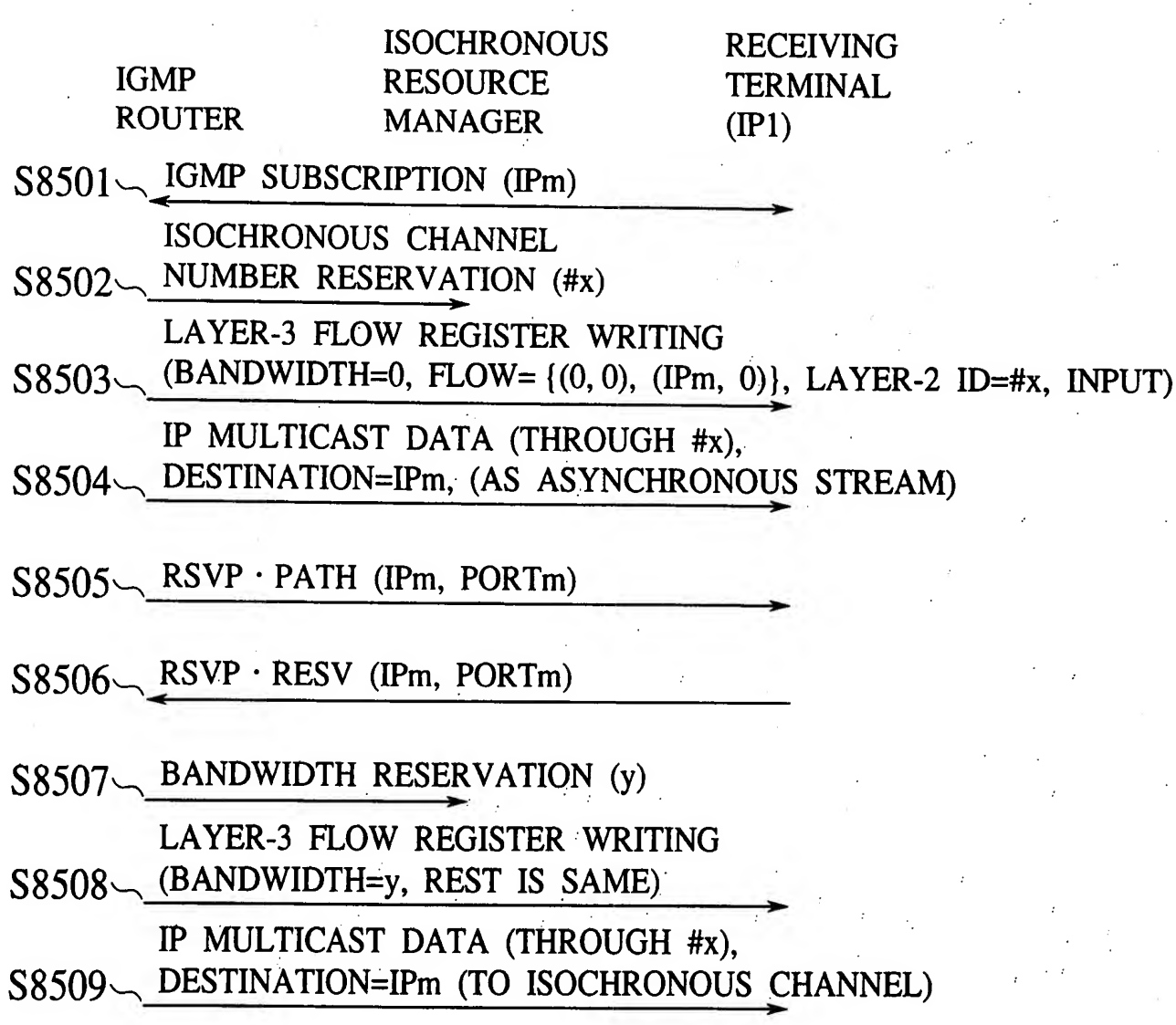


FIG.74

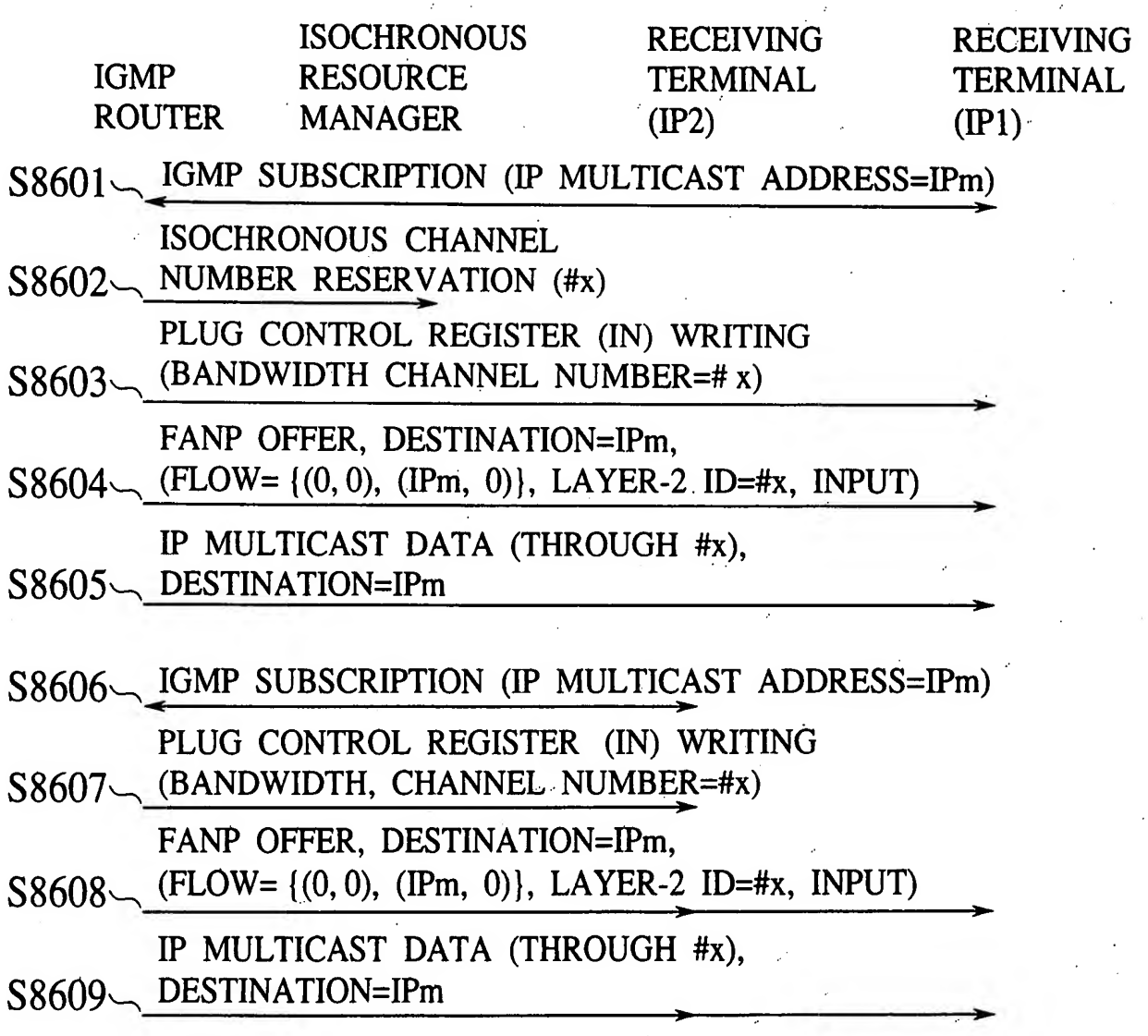


FIG.75

FANP OFFER MESSAGE

VERSION NUMBER
FLOW ID
SOURCE IP ADDRESS (0)
SOURCE PORT NUMBER (0)
DESTINATION IP ADDRESS (IPm)
DESTINATION PORT NUMBER (0)
LAYER-2 ID
LAYER-2 TYPE (IEEE 1394)
ID TYPE (ISOCHRONOUS CHANNEL NUMBER)
ID (#x)
DIRECTION (INPUT)

FIG.76

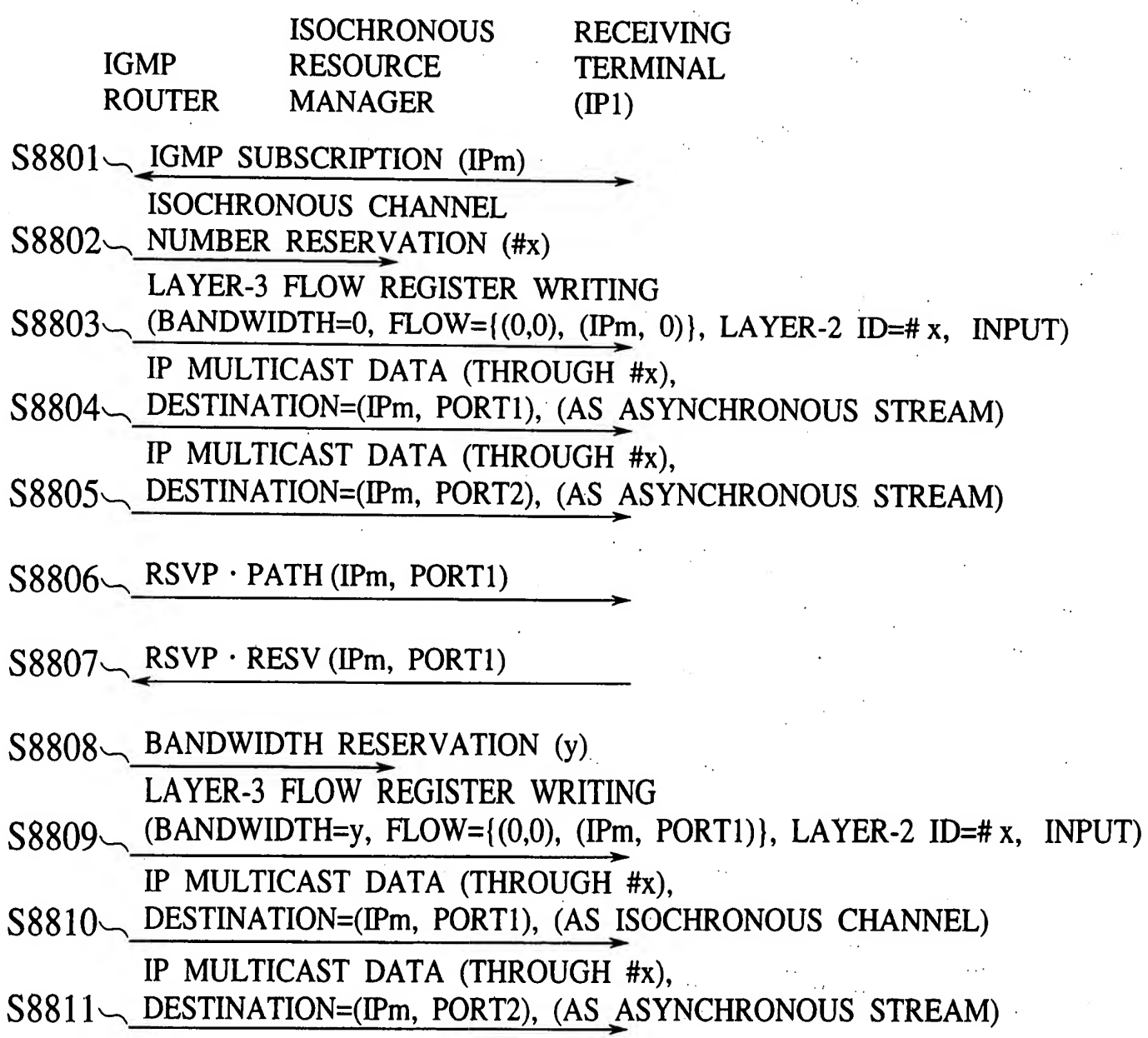


FIG.77

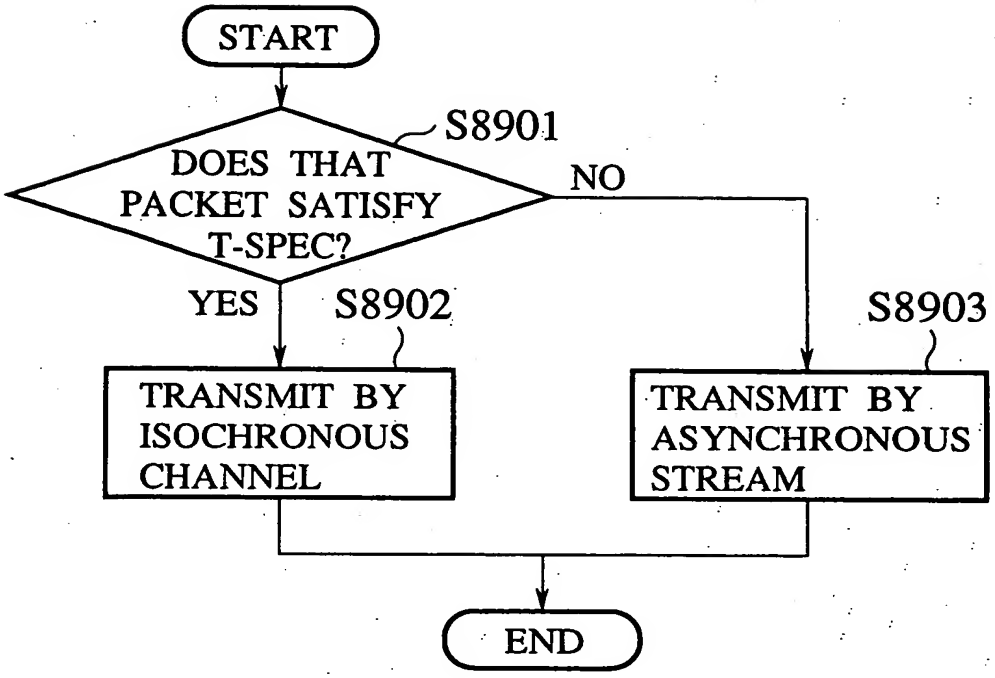

START
S8901
DOES THAT PACKET SATISFY T-SPEC?
NO
YES
S8902
S8903
TRANSMIT BY ISOCHRONOUS CHANNEL
TRANSMIT BY ASYNCHRONOUS STREAM
END

FIG.78

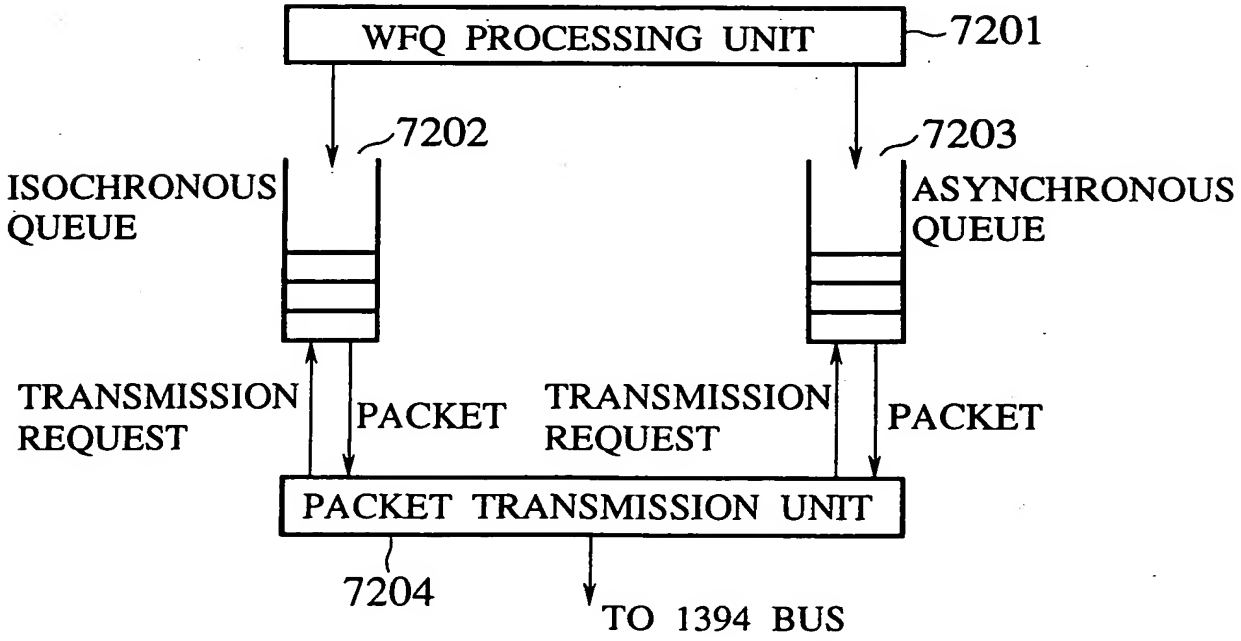

WFQ PROCESSING UNIT
7201
7202
7203
ISOCHRONOUS QUEUE
ASYNCHRONOUS QUEUE
TRANSMISSION REQUEST
PACKET
TRANSMISSION REQUEST
PACKET
PACKET TRANSMISSION UNIT
7204
TO 1394 BUS

FIG.79

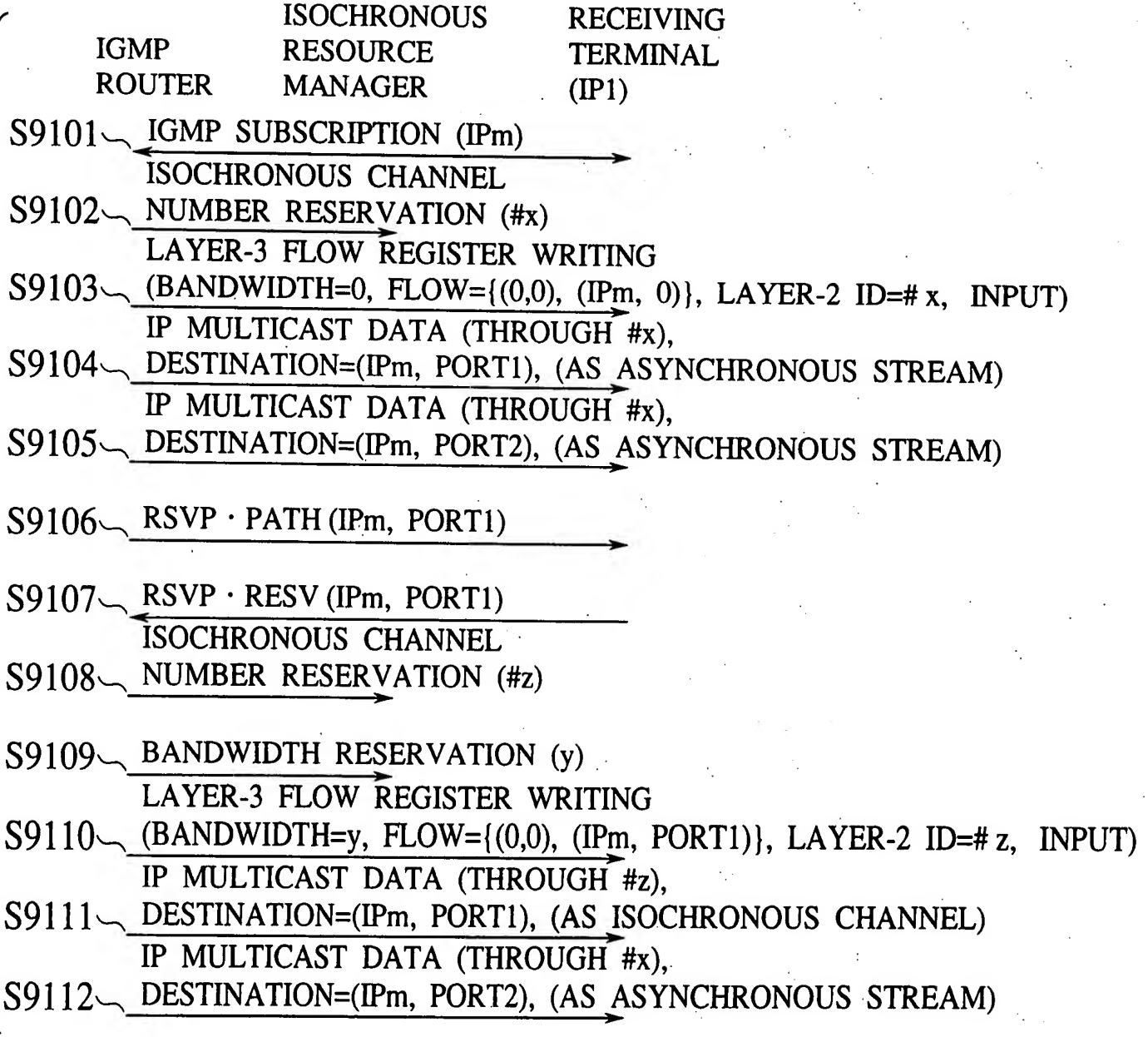


FIG.80

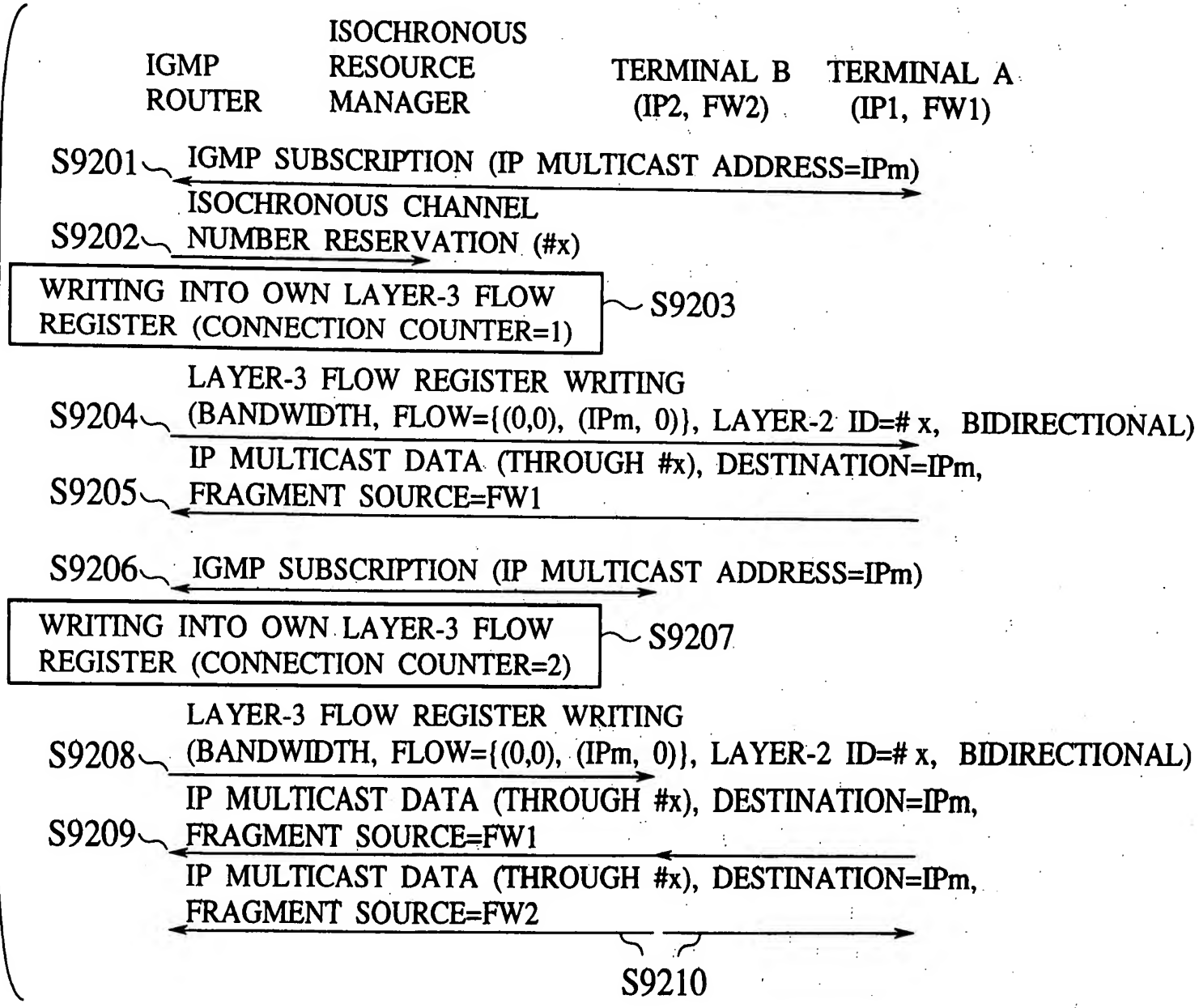


FIG.81A

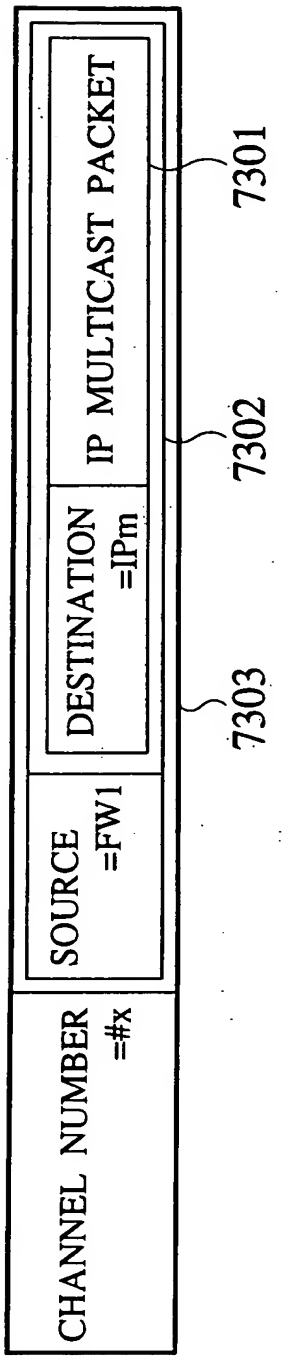


FIG.81B

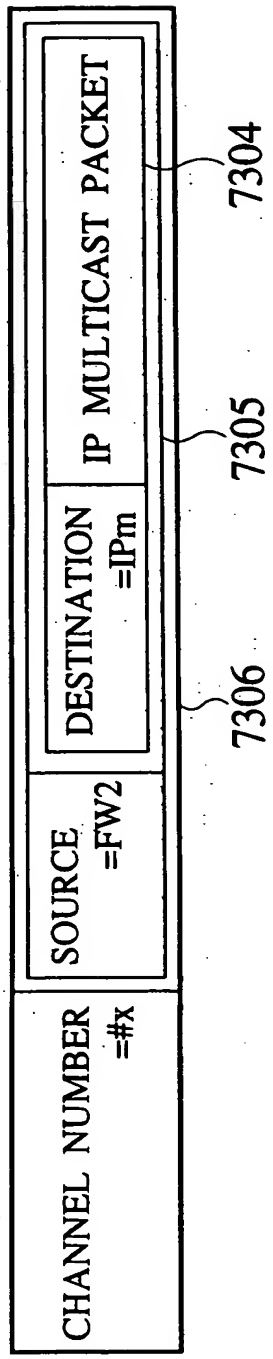


FIG.82

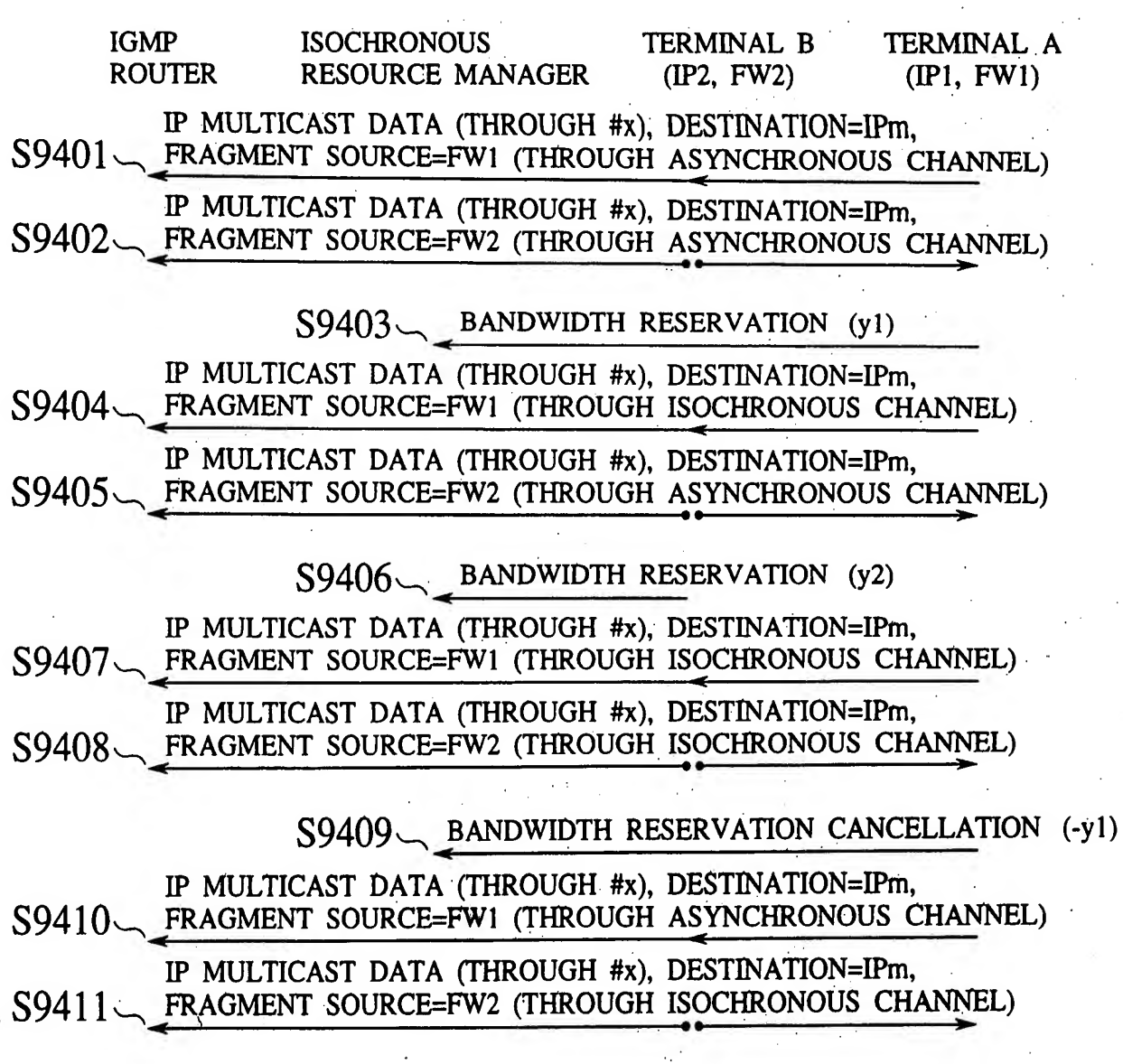


FIG.83